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Routine Screening and Referrals for Post-Traumatic Stress Disorder (PTSD) after Returning from Operation Iraqi Freedom in 2005, U.S. Armed Forces

As part of its Force Health Protection program, the U.S. military requires post-deployment health assessments (PDHA) of all service members upon return from overseas deployments. The PDHA consists of a questionnaire (DD Form 2796) and a consultation with a primary care provider. Consultations allow service members to discuss their health and/or deployment-related exposure concerns with a health professional. They also enable care providers to solicit information regarding positive responses to screening questions and to refer service members for indicated evaluations, counseling, and treatment.[1]

One section of the PDHA questionnaire screens for symptoms of post-traumatic stress disorder (PTSD), a condition that can clinically emerge weeks to months after psychologically traumatic experiences.[2,3] The four items on the PDHA questionnaire that relate to PTSD correspond to symptom clusters characteristic of PTSD.[3,4] Endorsement of two or more of the four PTSD-specific items is considered a sensitive indicator of increased risk for PTSD.[1,4,5] A referral to a mental health professional may be indicated if, after confidentially discussing these and other PDHA form responses, the service member and care provider decide further evaluation or care is warranted. In 2006, the U.S. Government Accountability Office (GAO) examined the mental health referral process in light of seemingly low referral rates for service members who screened positive for PTSD.[5] Among the findings, the GAO report highlighted differences across military service branches in referral rates for service members who seemed similarly at risk for PTSD.[5]

During a recent review, service members returning from Operation Iraqi Freedom (OIF) had higher psychiatric hospitalization rates and reported more combat experiences and mental health concerns on PDHAs than contemporary deployers from other operations.[1] This report documents frequencies of self-reported symptoms and provider referrals during PDHAs among service members who subsequently showed evidence of PTSD. Specifically, the report summarizes responses to PTSD-related questions on PDHAs and medical referral experiences of OIF deployers who were diagnosed with PTSD within six months after return from deployment; and/or screened positive for PTSD on Post-Deployment Health Reassessment (PDHRA) questionnaires (DD Form 2900) that are routinely administered 3-6 months after return from deployment.[6]

Methods:

All data were obtained from the Defense Medical Surveillance System (DMSS).[7] Service members were included in the surveillance cohort if they completed a PDHA questionnaire after returning from an OIF-related deployment in 2005. The last PDHA that each cohort member completed within 60 days of a relevant OIF-related deployment was used for analysis. Responses to PDHRA questionnaires (DD Form 2900) were used in a subanalysis if dates of departure reported on questionnaires were within 60 days of deployment end dates documented in the DMSS.

Clinical diagnoses of PTSD were ascertained from records of hospitalizations and ambulatory visits within 6 months following return from OIF. For surveillance purposes, a "case of PTSD" was defined as a hospitalization or outpatient visit with a PTSD diagnosis (ICD-9-CM code: 309.81) in any diagnostic position; and a "possible case" of PTSD was defined as a returned deployer who screened positive for PTSD (endorsement of at least 2 out of 4 PTSD-specific items) on a post-deployment health reassessment questionnaire (DD Form 2900), irrespective of clinical experience.

Results:

In 2005, 289,355 service members returned from deployments in support of OIF. Of these, approximately three-fourths (76.8%) had PDHAs and one-third (33.5%) had PDHRAs that met the inclusion criteria for this analysis. **(Table 1)**. Not surprisingly, most (n=91,408, 94.4%) of those with PDHRAs had PDHAs. Deployers who were female, in the Army or Air Force, in the Reserve component, and in non-combat-specific occupations were more likely than their respective counterparts to have PDHAs and PDHRAs **(Table 1)**.

Among PDHA respondents overall, approximately one of four (24.9%) were referred for health concerns (any type), one of 10 (10.5%) screened positive for PTSD, and one of 25 (4.1%) were referred for mental health concerns **(Table 2)**.

Among PDHA respondents who were clinically diagnosed with PTSD within six months after return from OIF ("cases") (n=2,676), more than half (54.7%) had been referred for a health concern (any type), nearly half (48.1%)

had screened positive for PTSD, and more than one-fourth (27.0%) had been referred for a mental health concern during their PDHAs **(Table 3)**. Among cases overall, the most likely to have screened positive for PTSD on their PDHAs were those in medical occupations (54.7%), in the Reserve component (53.0%), and officers (52.9%), while the least likely were those in the Air Force (36.6%) or Marine Corps (36.7%) and the youngest aged (<20 years) (39.6%) **(Table 3)**.

Among PDHA respondents who screened positive for PTSD during health reassessments conducted 3-6 months after return from OIF ("possible cases") (n=15,755), approximately 4 of 10 (39.5%) had been referred for a health concern (any type), nearly one-third (29.9%) had screened positive for PTSD, and approximately one of ten (10.2%) had been referred for a mental health concern on the PDHA **(Table 4)**. Among possible cases overall, the most likely to have screened positive for PTSD on the PDHA were those in the Marine Corps (36.3%) and in medical occupations (36.3%), while the least likely were those in the Air Force (14.9%) and in the Navy/Coast Guard (22.0%) **(Table 4)**.

In general, during PDHAs, females were more likely than males to receive referrals for health concerns in general and for mental health concerns specifically **(Table 2)**. However, females were not more likely than males to screen positive for PTSD during PDHAs **(Table 2)**. In addition, female and male cases (per clinical diagnoses) and possible cases (per PDHRA responses) of PTSD had similar prevalences of screening positive for PTSD on their PDHA questionnaires **(Tables 3, 4)**.

More than two-thirds (68.3%) of all PDHA forms were completed prior to reported end dates of the respective deployments **(Table 1)**. In general, deployers who completed

Table 1. Characteristics of service members who completed deployments (ending in 2005) in support of Operation Iraqi Freedom (OIF), in relation to completion of Post-Deployment Health Assessment (PDHA) (DD Form 2796) and Post-Deployment Health Reassessment (PDHRA) (DD Form 2900) questionnaires

	Total		With PDHA		With PDHRA*	
	No.	Column %	No.	Row %	No.	Row %
Sex						
Male	260,370	90.0	198,989	76.4	85,822	33.0
Female	28,985	10.0	23,194	80.0	11,002	38.0
Age group						
<20	5,595	1.9	4,087	73.0	1,588	28.4
20-24	102,215	35.3	79,371	77.7	31,857	31.2
25-29	63,538	22.0	49,596	78.1	21,133	33.3
30-34	41,585	14.4	31,717	76.3	15,109	36.3
35-39	35,907	12.4	26,919	75.0	13,322	37.1
40+	40,515	14.0	30,493	75.3	13,815	34.1
Service						
Army	175,525	60.7	150,218	85.6	71,026	40.5
Air Force	51,618	17.8	40,404	78.3	21,906	42.4
Marine Corps	43,672	15.1	25,024	57.3	2,360	5.4
Navy/Coast Guard	18,540	6.4	6,537	35.3	1,532	8.3
Component						
Active	180,507	62.4	135,047	74.8	54,741	30.3
Reserve	108,848	37.6	87,136	80.1	42,083	38.7
Grade						
Enlisted, junior (E1-E4)	121,452	42.0	94,895	78.1	37,545	30.9
Enlisted, mid (E5-E6)	104,201	36.0	80,986	77.7	37,857	36.3
Enlisted, senior (E7-E9)	25,679	8.9	19,273	75.1	8,870	34.5
Officer	38,023	13.1	27,029	71.1	12,552	33.0
Occupation						
Combat	182,332	63.0	136,764	75.0	58,331	32.0
Health	16,702	5.8	13,206	79.1	6,389	38.3
Other	90,321	31.2	72,213	80.0	32,104	35.5
Total	289,355	100.0	222,183	76.8	96,824	33.5

*Of service members with PDHRA, 94.4% (n=91,408) had a PDHA.

Table 2. Service members who completed Post-Deployment Health Assessments (PDHA) for OIF-related deployments (ending in 2005), by responses to PTSD-specific screening questions, mental health referrals, and health referrals overall

	Total	PTSD screen positive		Mental health referral		Any health referral	
		No.	row %	No.	row %	No.	row %
Sex							
Male	198,989	20,982	10.5	7,881	4.0	48,620	24.4
Female	23,194	2,386	10.3	1,183	5.1	6,774	29.2
Age group							
<20	4,087	407	10.0	128	3.1	735	18.0
20-24	79,371	8,725	11.0	3,352	4.2	17,561	22.1
25-29	49,596	5,453	11.0	2,139	4.3	11,854	23.9
30-34	31,717	3,385	10.7	1,349	4.3	8,005	25.2
35-39	26,919	2,599	9.7	972	3.6	7,349	27.3
40+	30,493	2,799	9.2	1,124	3.7	9,890	32.4
Service							
Army	150,218	19,211	12.8	7,487	5.0	45,054	30.0
Air Force	40,404	758	1.9	471	1.2	4,380	10.8
Marine Corps	25,024	2,816	11.3	897	3.6	4,554	18.2
Navy/Coast Guard	6,537	583	8.9	209	3.2	1,406	21.5
Component							
Active	135,047	13,199	9.8	5,273	3.9	28,609	21.2
Reserve	87,136	10,169	11.7	3,791	4.4	26,785	30.7
Grade							
Enlisted, junior (E1-E4)	94,895	11,361	12.0	4,629	4.9	22,841	24.1
Enlisted, mid (E5-E6)	80,986	8,782	10.8	3,391	4.2	21,847	27.0
Enlisted, senior (E7-E9)	19,273	1,517	7.9	534	2.8	5,205	27.0
Officer	27,029	1,708	6.3	510	1.9	5,501	20.4
Occupation							
Combat	136,764	14,374	10.5	5,252	3.8	32,317	23.6
Health	13,206	1,836	13.9	680	5.2	3,242	24.6
Other	72,213	7,158	9.9	3,132	4.3	19,835	27.5
Location (timing) of PDHA							
In theater (before return from OIF)	151,667	15,400	10.2	6,511	4.3	38,864	25.6
Out of theater (after return)	70,516	7,968	11.3	2,553	3.6	16,530	23.4
Total	222,183	23,368	10.5	9,064	4.1	55,394	24.9

PDHAs before ("in theater") compared to after deployment end dates were more likely to receive referrals (overall and for mental health concerns) but less likely to screen positive for PTSD **(Table 2)**. Similarly, among cases and possible cases of PTSD, those who completed PDHAs before their deployments ended were more likely than those who completed them later to have received referrals (overall and mental health related) but less likely to have screened positive for PTSD **(Tables 3, 4)**.

Editorial comment:

Post-deployment health assessments are routinely conducted in the U.S military to detect and enable appropriate follow-up care for adverse physical and/or mental health conditions that may be associated with deployment experiences or exposures. Because some effects of deployment may not manifest until months later, the PDHRA was designed to reassess the health statuses of deployers 3-6 months after they return.

The analyses reported here were designed to assess the general "performance" of the PTSD screening portion of the PDHA and describe differences in performance in relation to characteristics of respondents and the timing of PDHAs.

Overall, the PDHA screen for PTSD identified approximately half of those who were clinically diagnosed with PTSD within six months ("cases") and approximately one-third of those who reported symptoms of PTSD 3-6 months ("possible cases") after return from OIF. Notably, cases were much more likely than possible cases, and possible cases were much more likely than deployers overall, to receive referrals during PDHAs — for any concerns and mental health concerns specifically. The findings are consistent with those of other studies that suggest that the early clinical manifestations

Table 3. Service members who received clinical diagnoses of PTSD within six months after returning from OIF-related deployments (ending in 2005), in relation to their responses to PTSD-specific screening questions, mental health referrals, and health referrals (any type) during Post Deployment Health Assessments (PDHA)

	Total	PTSD screen positive		Mental health referral		Any health referral	
		No.	row %	No.	row %	No.	row %
Sex							
Male	2,380	1,152	48.4	622	26.1	1,282	53.9
Female	296	136	46.0	101	34.1	181	61.2
Age group							
<20	48	19	39.6	11	22.9	22	45.8
20-24	882	395	44.8	235	26.6	429	48.6
25-29	571	275	48.2	160	28.0	310	54.3
30-34	409	214	52.3	112	27.4	224	54.8
35-39	327	158	48.3	86	26.3	184	56.3
40+	439	227	51.7	119	27.1	294	67.0
Service							
Army	2,200	1,095	49.8	601	27.3	1,250	56.8
Air Force	142	52	36.6	32	22.5	61	43.0
Marine Corps	210	77	36.7	54	25.7	94	44.8
Navy/Coast Guard	124	64	51.6	36	29.0	58	46.8
Component							
Active	1,681	761	45.3	444	26.4	843	50.2
Reserve	995	527	53.0	279	28.0	620	62.3
Grade							
Enlisted, junior (E1-E4)	1,275	594	46.6	331	26.0	657	51.5
Enlisted, mid (E5-E6)	1,051	520	49.5	299	28.5	611	58.1
Enlisted, senior (E7-E9)	210	100	47.6	60	28.6	122	58.1
Officer	140	74	52.9	33	23.6	73	52.1
Occupation							
Combat	1,526	739	48.4	414	27.1	830	54.4
Health	307	168	54.7	85	27.7	149	48.5
Other	843	381	45.2	224	26.6	484	57.4
Location (timing) of PDHA							
In theater (before return)	1,581	717	45.4	451	28.5	881	55.7
Out of theater (after return)	1,095	571	52.2	272	24.8	582	53.2
Total	2,676	1,288	48.1	723	27.0	1,463	54.7

of PTSD can be varied (with signs and symptoms not clearly referable to psychological causes)[8]; in turn, they can delay and mislead appropriate clinical evaluation and treatment.

Screening for PTSD-related symptoms during PDHAs is designed to alert service members and their health care providers of early manifestations of PTSD. While more than 53% of officers, health care workers, and reserve component members who were diagnosed with PTSD screened positive on the PDHA, fewer than 40% of PTSD cases in the Air Force, Marine Corps, and/or among teenagers screened positive **(Table 3).** The finding may reflect differences in real or perceived stigmas associated with acknowledging or seeking care for PTSD-related symptoms, different perceptions and/or concerns regarding the confidentiality of PDHA responses and clinical encounters, different perceptions of the quality of military mental health care, and/or differences in barriers to care for PTSD-related symptoms.[9] Also, in some deployers, PTSD symptoms may be exacerbated or emerge after they return to their homes or permanent duty stations.[10] More practically, there may simply be differences in the physical settings in which PDHAs are administered — private, enclosed spaces may encourage more honest reporting of symptoms. Of note, the variations in screening results among clinically confirmed cases from various Services and demographic subgroups were not apparent in relation to mental health referrals during PDHAs **(Table 3).** For example, among clinically confirmed PTSD cases, Marines (25.7%) and soldiers (27.3%), and those in combat (27.1%) and medical (27.7%) occupations, received mental health referrals during PDHAs at similar rates **(Table 3).**

Interestingly, the timing of PDHA completion (before versus after return from theater) had an effect different from that expected by DoD officials cited in the 2006 GAO report. For example, in 2005, those who completed PDHAs

Table 4. Service members who screened positive* for PTSD during Post-Deployment Health Reassessments (PDHRA) after returning from OIF-related deployments (ending in 2005), in relation to their responses to PTSD-specific screening questions, mental health referrals, and health referrals (any type) during Post Deployment Health Assessments (PDHA)

	Total	PTSD screen positive		Mental health referral		Any health referral	
		No.	row %	No.	row %	No.	row %
Sex							
Male	14,078	4,209	29.9	1,393	9.9	5,484	39.0
Female	1,677	494	29.5	207	12.3	743	44.3
Age group							
<20	227	73	32.2	11	4.9	62	27.3
20-24	5,016	1,458	29.1	478	9.5	1,745	34.8
25-29	3,352	1,072	32.0	363	10.8	1,240	37.0
30-34	2,451	771	31.5	286	11.7	1,020	41.6
35-39	2,234	661	29.6	231	10.3	978	43.8
40+	2,475	668	27.0	231	9.3	1,182	47.8
Service							
Army	14,562	4,458	30.6	1,512	10.4	5,870	40.3
Air Force	766	114	14.9	53	6.9	194	25.3
Marine Corps	259	94	36.3	21	8.1	91	35.1
Navy/Coast Guard	168	37	22.0	14	8.3	72	42.9
Component							
Active	6,606	2,060	31.2	680	10.3	2,271	34.4
Reserve	9,149	2,643	28.9	920	10.1	3,956	43.2
Grade							
Enlisted, junior (E1-E4)	6,608	2,025	30.6	735	11.1	2,486	37.6
Enlisted, mid (E5-E6)	6,673	1,999	30.0	657	9.9	2,733	41.0
Enlisted, senior (E7-E9)	1,320	349	26.4	122	9.2	563	42.7
Officer	1,154	330	28.6	86	7.5	445	38.6
Occupation							
Combat	9,235	2,852	30.9	943	10.2	3,613	39.1
Health	1,141	414	36.3	145	12.7	427	37.4
Other	5,379	1,437	26.7	512	9.5	2,187	40.7
Location (timing) of PDHA							
In theater (before return)	8,553	2,405	28.1	938	11.0	3,602	42.1
Out of theater (after return)	7,202	2,298	31.9	662	9.2	2,625	36.5
Total	15,755	4,703	29.9	1,600	10.2	6,227	39.5

* Screen positive: endorsed at least 2 of 4 PTSD-specific questions on the PDHRA

while still deployed had higher referral rates (although a lower prevalence of PTSD screen positives) than those who completed them later. Among cases of PTSD (based on clinical diagnoses), prevalences of PTSD screen positives did not sharply vary based on the timing of PDHAs (prevalence of PTSD screen positive, by timing of PDHA in relation to return, before: 45.4%; after: 52.2%), particularly in light of potentially confounding differences (e.g., service, military grade) between the groups **(Table 3)**. Also, the natural history of PTSD suggests that symptoms of PTSD may not have been present in some cases who completed PDHAs early.[2,3] Overall, the findings are equivocal regarding the question of whether there are systematic differences in self-reporting of symptoms and/or in health care provider assessments based on the timing and location of the PDHA.

As with findings of any public health surveillance analysis, those reported here must be interpreted with consideration of limitations. For example, the definitions used to classify "cases," "possible cases," and non-cases of PTSD may not reliably indicate the "true" case statuses of all OIF deployers. In this regard, some returned deployers with PTSD may not seek care for their symptoms, may be reluctant to report their symptoms on screening questionnaires or to health care providers, and/or may report old, nonexistent, or irrelevant symptoms on screening questionnaires (e.g., to increase the likelihood that symptoms that may emerge after service may be considered "service-related"). Also, some health care providers may attribute PTSD-related symptoms to other causes, be wary of reporting PTSD on standardized medical records, and/or inappropriately use the specific diagnosis code for PTSD to report "history of" or "rule out" cases. In addition, the cut point (endorsement of at least 2 of 4 questions) used to discriminate positive from negative responses to the PTSD screening questions is

generally considered a relatively sensitive but not very specific discriminator — in turn, the predictive value of a positive screening result would not be expected to be very high. Also, many deployers (particularly, in the Reserve component) may have sought care or been treated for PTSD outside of the Military Health System. Finally, the frequencies, natures, and magnitudes of psychologically traumatic experiences of OIF participants in 2005, and experiences regarding screening for and clinically managing PTSD among them, may not reflect current experiences. Despite these limitations, the findings in this report are informative and potentially useful.

In summary, in 2005, up to half of all returned deployers who were eventually diagnosed with PTSD were referred for further health care for one reason or another. Thus, because nearly half of PTSD cases diagnosed in the first six months post-return were referred for medical follow-ups independent of their PTSD screening results, they likely received necessary care soon after returning. An emerging question is whether immediately referred cases have better eventual outcomes compared with other cases. Surveillance for care use, hospitalizations, and service attrition among cases may help answer this question. Clearly, more detailed characterization of the referral process for mental health and other concerns is indicated.[5] Future reports in the *MSMR* will examine differential outcomes based on PDHA screening results.

Analysis and report by Christopher B. Martin, MHS, Army Medical Surveillance Activity.

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Relationship between Influenza Vaccination and Subsequent Diagnoses of Group A Streptococcus-related Illnesses, Basic Combat Trainees, U.S. Army, 2002-2006

For decades, infections with group A beta hemolytic streptococci (GABHS) have threatened the health and training abilities of U.S. military recruits — particularly, during high risk fall-winter "influenza seasons."[1,2]

GABHS infections are often asymptomatic; and of those that are clinically significant, most are expressed as acute, febrile tonsillo-pharyngitis ("strep throat") that is transiently debilitating. However, some virulent GABHS strains cause invasive diseases that can be severe (e.g., peritonsillar abscess) and even life threatening (e.g., pneumonia, necrotizing fasciitis, toxic shock). Finally, some "rheumatogenic" strains of GABHS have delayed clinical effects that are acutely debilitating (e.g., acute rheumatic fever) and often chronically disabling (e.g., valvular heart disease).[1-4]

Since the 1950s, at various training camps and during various periods, benzathine penicillin (BPG) has been given to all non-allergic trainees during their medical in-processing to military service before they begin recruit training ("tandem prophylaxis"). Tandem prophylaxis is designed to prevent the introduction of virulent strains of GABHS into recruit camps and to protect new recruits from acquiring GABHS infections during the first few weeks of training. [2,4]

In general, tandem prophylaxis using BPG (sometimes, with other antibiotics for penicillin allergic trainees) has been effective at limiting cases and outbreaks of severe GABHS-related diseases.[2,4] Of note, some recruit camps have had significant outbreaks of GABHS-related diseases soon after discontinuing tandem prophylaxis.[4] In 2006, 15 basic combat trainees at Fort Leonard Wood, Missouri, were hospitalized during a GABHS outbreak that quickly followed the temporary cessation of routine BPG prophylaxis of new recruits because of supply shortages.[5]

Because new recruits are daily "samples" of the young adults of the United States and its territories, numerous and varied respiratory pathogens are continuously seeded into and cocirculate in recruit populations, particularly during fall-winter seasons. Cocirculating respiratory pathogens can interact through many mechanisms. The most studied and best documented interactions are between influenza and bacterial respiratory pathogens, including GABHS.[6-9] Not surprisingly, during past influenza pandemics, streptococcal pneumonias caused significant numbers of deaths, including among young adults.[6]

In summary, recruit populations are at high risk of being seeded with and propagating influenza and GABHS, particularly during fall-winter seasons; both influenza and GABHS are significant threats to the health and military operational effectiveness of trainees; and there are significant clinical and epidemiologic interactions between influenza and GABHS. To counter the threats of influenza and GABHS-related diseases, all new recruits are immunized with the current year's influenza vaccine, and many others are given routine prophylaxis against GABHS, before beginning basic combat training.

To assess the effects, if any, of influenza immunization on the incidence of GABHS-related illnesses in perennially high risk settings and seasons, diagnoses of streptococcal illnesses during medical encounters of U.S. Army trainees were assessed in relation to their reported influenza vaccination statuses during four recent "influenza seasons."

Methods:

The surveillance period included the four "influenza seasons" (1 September to 30 April) of the years 2002-03, 2003-04, 2004-05, and 2005-06. The surveillance population included all members of active components of the U.S. Army who were trainees during the surveillance period at a U.S. Army basic combat training (BCT) site: Fort Benning, GA; Fort Jackson, SC; Fort Knox, KY; Fort Leonard Wood, MO; or Fort Sill, OK. For surveillance purposes, cases were defined as members of the surveillance population with at least one outpatient diagnosis of a GABHS-related illness (ICD-9-CM codes: 034.0, 041.01, 320.2, 390-392, 482.31, 728.86) during the surveillance period. Each GABHS case was matched by BCT site to 4 trainees who had no outpatient diagnoses of GABHS-related illnesses documented during the period ("noncases").

To prevent potential bias from routinely administered BPG prophylaxis at Forts Benning, Leonard Wood, and Sill, GABHS cases that occurred within 30 days (the estimated protective effect from a single dose of BPG) of the start of military service were excluded. Also, only GABHS diagnoses that occurred at least 14 days (the estimated time to development of protective antibodies after immunization) following influenza vaccinations were considered "vaccinated" cases.[10]

Cases and non-cases were assessed with respect to demographic/military characteristics and exposure to influenza vaccination during each influenza season. As multiple vaccines are typically administered to all new recruits, trainees with no documented vaccinations were excluded. A

conditional logistic regression model matched on BCT site controlled for the potentially confounding effects of gender, age, and month of entry into service.

All data were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS).

Results:

Approximately two-thirds of all cases (66.0%; n=1,106) and four-fifths of all noncases (80.3%; 4,421) had documented influenza vaccinations during the influenza seasons of interest **(Table 1)**. During each influenza season, GABHS cases were significantly less likely than noncases to have received influenza vaccinations — overall and after adjusting for sex, age group, month of entry into military service, and training site **(Table 1)**. During the four seasons, the estimated protective effects of influenza vaccination against streptococcal-related illnesses ranged from approximately 50-85% **(Table 1)**.

Across all seasons combined, GABHS cases were approximately 60% less likely to have received an influenza vaccine than noncases **(Table 2)**. After adjusting for vaccination status and other covariates, males were more likely to have

Table 1. Odds ratio (OR), diagnosis of streptococcal-related illness in relation to influenza vaccination status, among basic combat trainees, active component, U.S. Army, by influenza season, September 2002-April 2006

Influenza season	Influenza vaccine	Cases No. (%)	Controls No. (%)	OR (95% CI)	Adjusted OR (95% CI)*
2002-03	Yes	136 (49.3)	675 (61.1)	0.56 (0.42-0.75)	0.51 (0.38-0.69)
	No	140 (50.7)	429 (38.9)	ref	ref
2003-04	Yes	277 (74.3)	1,278 (85.8)	0.45 (0.34-0.60)	0.38 (0.28-0.52)
	No	96 (25.7)	212 (14.2)	ref	ref
2004-05	Yes	117 (62.2)	626 (83.4)	0.27 (0.18-0.40)	0.14 (0.09-0.23)
	No	71 (37.8)	125 (16.6)	ref	ref
2005-06	Yes	200 (74.4)	973 (90.4)	0.26 (0.18-0.38)	0.26 (0.17-0.39)
	No	69 (25.7)	103 (9.6)	ref	ref

*Adjusted for sex, age, month of service entry, and BCT site

Table 2. Odds ratio (OR), diagnosis of streptococcal-related illness in relation to demographic characteristics, influenza season, and month of entry into service, among basic combat trainees, active component, U.S. Army, during influenza seasons, September 2002-April 2006

Characteristic		Cases (N=1,106) No. (%)	Controls (N=4,421) No. (%)	OR (95% CI)	Adjusted OR* (95% CI)
Influenza vaccine	Yes	730 (66.0)	3,552 (80.3)	0.44 (0.38-0.52)	0.39 (0.33-0.46)
	No	376 (34.0)	869 (19.7)	ref	ref
Sex	Male	920 (83.2)	3,583 (81.1)	1.21 (0.99-1.47)	1.24 (1.01-1.51)
	Female	186 (16.8)	838 (18.9)	ref	ref
Age	17-19	591 (53.4)	2,159 (48.8)	1.85 (1.16-2.96)	1.91 (1.19-3.09)
	20-24	432 (39.1)	1,727 (39.1)	1.69 (1.06-2.71)	1.75 (1.08-2.83)
	25-29	62 (5.6)	393 (8.9)	1.07 (0.63-1.82)	1.07 (0.62-1.84)
	30-35	21 (1.9)	142 (3.2)	ref	ref
Influenza season	2002-03	276 (24.9)	1,104 (25.0)	1.00 (0.80-1.26)	0.83 (0.65-1.06)
	2003-04	373 (33.7)	1,490 (33.7)	1.00 (0.81-1.24)	1.12 (0.89-1.41)
	2004-05	188 (17.0)	751 (17.0)	1.00 (0.78-1.28)	0.93 (0.72-1.21)
	2005-06	269 (24..3)	1,076 (24.3)	ref	ref
Month of entry into service	September	142 (12.8)	535 (12.1)	2.03 (1.45-2.83)	2.15 (1.52-3.04)
	October	195 (17.6)	840 (19.0)	1.65 (1.21-2.26)	1.76 (1.28-2.42)
	November	120 (10.9)	580 (13.1)	1.41 (1.00-1.99)	1.52 (1.08-2.15)
	December	39 (3.5)	77 (1.7)	4.43 (2.66-7.37)	5.46 (3.21-9.30)
	January	256 (23.2)	811 (18.3)	2.41 (1.78-3.27)	2.88 (2.11-3.93)
	February	146 (13.2)	558 (12.6)	1.90 (1.36-2.66)	2.16 (1.54-3.04)
	March	136 (12.3)	536 (12.1)	1.81 (1.29-2.54)	2.04 (1.44-2.88)
	April	72 (6.5)	484 (11.0)	ref	ref

*Adjusted for sex, age, season, month of service entry, and basic training site.

a GABHS diagnosis than females (adjusted odds ratio [OR], 1.24; 95% CI, 1.01-1.51). Younger age was also an independent risk factor for a GABHS-related diagnosis: trainees younger than 25 years had nearly twice the odds of a streptococcal-related medical encounter as those 30 years and older.

Editorial comment:

This report documents a broad and persistent relationship between influenza immunization prior to beginning basic combat training and decreased incidence of diagnoses of GABHS-related illnesses during training. The results suggest that influenza immunization may decrease the risk of acquiring and/or change the clinical expressions of streptococcal infections during recruit training. Because there are well documented epidemiologic and clinical interactions between influenza and bacterial respiratory pathogens, beneficial effects of influenza vaccination on streptococcal-related illnesses are plausible. However, the findings must be interpreted cautiously.

For example, the case defining endpoints of the analysis were streptococcus-related diagnoses recorded during ambulatory visits. During ambulatory visits of recruits, many streptococcus-related diagnoses are likely based on clinical presentations rather than culture results. From clinical presentations alone, it is difficult to discern the infectious causes of acute febrile respiratory illnesses, including tonsillo-pharyngitis.[3,11] In general, one would expect that such misclassifications would be unrelated to influenza immunization status. However, if careproviders believed that all recruits were immunized against influenza, they might be predisposed to misdiagnosis influenza-like illnesses due to "influenza" as other (including streptococcal-related) conditions. In turn, if true influenza occurred more often among unimmunized than immunized recruits, and if influenza cases were sometimes misclassified as streptococcal illnesses, then there would be more "false positive" diagnoses of streptococcal illnesses among recruits who were unimmunized than immunized against influenza.

Also, tandem prophylaxis with benzathine penicillin not only protects recipients from acquiring GABHS infections during the first few weeks of training but also prevents the seeding of GABHS strains into the recruit population. To the extent that recruit camps are epidemiologically closed — hence, isolated from outside sources of GABHS — tandem prophylaxis would lower risk of streptococcal illnesses during the entire basic training period. If trainees who received influenza immunizations were more likely than others to receive benzathine penicillin, then the apparent association between influenza immunization and GABHS-related illnesses could reflect the prolonged, population-level effects of tandem BPG prophylaxis.

In addition, the results presented in this report are based on routinely reported medical administrative records. All non-allergic service members (including all new recruits) are supposed to receive the current year's influenza vaccine. The high prevalences of unvaccinated recruits (per administrative records) in this surveillance (30-50%) may reflect incomplete reporting (all recruits with no immunizations on record were excluded to minimize misclassification due to missing records). Undoubtedly, some trainees did not receive influenza immunizations because of egg allergies; these are estimated to affect less than 2% of children.[12] Also, because this analysis included all recruits in training between September and April, significant proportions of them likely entered service after the prior year's influenza vaccine was removed from use and before the next year's vaccine became available. Unless such recruits were targeted for "catch up" with the current year's vaccine, they would have remained unimmunized against influenza throughout their basic training periods.

With the appropriate cautions in mind, the results of this report are interesting and potentially important, particularly when considered in the context of recent Army acute respiratory illness experiences.

In 1988, there was a large outbreak of streptococcal illnesses (including many cases of peritonsillar abscess and acute rheumatic fever) among trainees at or recently departed from Fort Leonard Wood, Missouri — tandem BPG prophylaxis was not in use at the time.[4] In response, all trainees at Fort Leonard Wood were given a single dose of BPG ("mass prophylaxis"), and tandem prophylaxis with BPG was begun.[4,13] Rates of febrile respiratory illnesses in general sharply declined and remained low.[13] The estimated effect of the prophylactic use of BPG was much greater than could be attributed to the prevention of streptococcal-related illnesses alone.[13]

Through the mid-1990s, most Army recruits received BPG and were immunized against influenza and adenovirus types 4 and 7 before they began basic combat training. While this regimen was employed, rates of febrile acute respiratory illnesses were consistently low, and there were no significant outbreaks of acute respiratory diseases (including streptococcal).[4]

In the late 1990s, the sole manufacturer of adenovirus vaccines ceased production; and in recent years, the supply of benzathine penicillin in the U.S. has been inconsistent. The 2006 Fort Leonard Wood outbreak occurred in the wake of production difficulties at the sole U.S. manufacturer of BPG[2].

In summary, respiratory pathogens of various types are continuously seeded into basic training populations. There are many epidemiologic and clinical interactions between respiratory pathogens — including, for example, between

influenza and GABHS. Given the synergisms among various pathogens, the effects of agent-specific interventions are likely also synergistic, i.e., greater in scopes and magnitudes than preventing agent-specific diseases alone. In turn, the preliminary finding that trainee influenza vaccination may have a broader effect than prevention of "influenza" alone is plausible and relevant to current practice.

All new recruits (without specific contraindications) should receive influenza immunizations before beginning basic combat training. Recruits who enter service before the current year's vaccine is available should be tracked to ensure that they receive the immunization as soon as the vaccine becomes available. Finally, further studies are needed to validate the findings of this report, e.g., with verified immunization statuses and laboratory confirmed GABHS cases.

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Cold Weather Injuries, U.S. Armed Forces, July 2002-June 2007

U.S. military operations are conducted in diverse weather and geographic conditions. Prolonged and/or intense exposures to cold can significantly impact the health, well-being and operational effectiveness of service members and their units. The U.S. military has developed extensive countermeasures against threats associated with training and operating in cold environments[1], and rates of hospitalization due to cold weather injuries among military personnel have generally declined during the past 20 years.[2] However, cold injuries still affect hundreds of service members each year. This report summarizes frequencies, rates, and correlates of risk of cold injuries among active component members of the U.S. Armed Forces during the past five years.

Methods:

The surveillance period was 1 July 2001 to 30 June 2007. The surveillance population included all individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period. For summary purposes, years were divided into 1 July through 30 June intervals to include complete "cold weather seasons" in each yearly interval.

Inpatient, outpatient and reportable medical event records in the Defense Medical Surveillance System (DMSS) were searched to identify all primary (first-listed) diagnoses of "frostbite" (ICD-9-CM codes: 991.0-991.3), "immersion foot" (ICD-9-CM: 991.4), "hypothermia" (ICD-9-CM: 991.6), and "other specified/unspecified effects of reduced temperature" (ICD-9-CM: 991.8-991.9) during the surveillance period. To exclude follow-up encounters for single injury episodes, only one of each type of cold injury per individual per year was included. Case counts, rates, and trends were summarized by Service, cases' assignment locations, and in relation to general military and demographic characteristics.

Results:

During the 2006-2007 cold weather season, 466 members of the U.S. Armed Forces had at least one medical encounter with a primary diagnosis of cold injury **(Tables 1-4)**. In general, in 2006-2007, rates of cold injuries (of any type) were slightly higher than in the prior year but generally similar to those in the preceding three years **(Figure 1)**.

During the past cold season, 65% of service members with cold injuries (of any type) were in the Army. The rate of cold injuries in the Army (60.6 per 100,000 person-years [p-yrs]) was more than twice the rate in the Marine Corps (29.6 per 100,000 p-yrs), more than three times the rate in the Air Force (19.4 per 100,000 p-yrs), and nearly five times the rate in the Navy (12.7 per 1,000 p-yrs) **(Tables 1-4)**.

In the Army, Air Force, and Marine Corps, the most frequently reported cold injury in the past year was "frostbite" **(Tables 1,3,4)**. In the Marine Corps, the rate of frostbite last year was higher than in any of the previous four years **(Table 4)**; however, in the Army and Air Force, rates of frostbite last year were similar to those in recent prior years **(Table 1,3)**. In the Navy, the most frequently reported cold injury last year was "hypothermia" — the rate last year was higher than in any of the previous four years **(Table 2)**.

During the five-year surveillance period, in the Army and Marine Corps, females had sharply higher rates than males of "frostbite" and "other/unspecified" cold injuries **(Tables 1,4)**. In contrast, in the Air Force and Navy, there were not strong relationships between gender and cold injury risk, either overall or by type **(Tables 2,3)**.

In the Army and Marine Corps, rates of cold injuries of all types were generally higher among the youngest aged

Figure 1. Incident rates of "any cold injury", by cold season and Service, U.S. Armed Forces, July 2002-June 2007

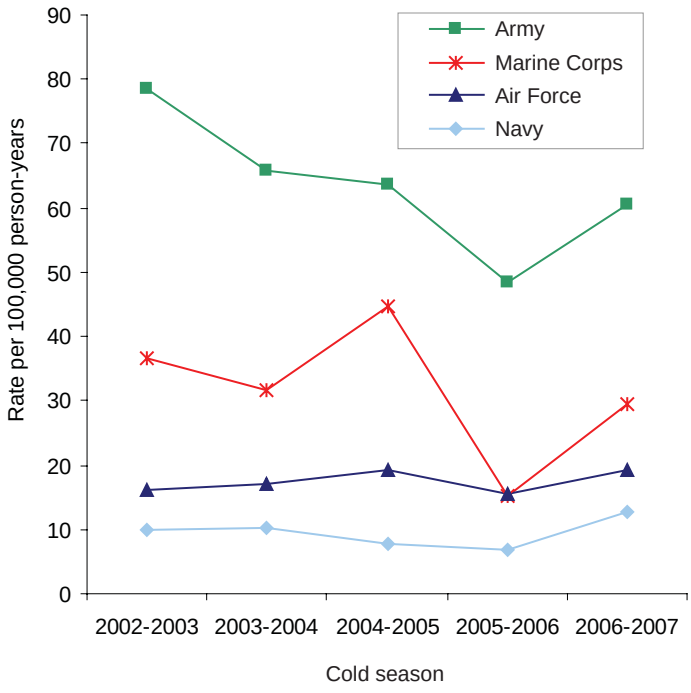

Table 1. Incident primary diagnoses of cold injuries, by type, active components, U.S. Army, July 2002-June 2007

	Frostbite		Immersion Foot		Hypothermia		Unspecified		Any cold	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	787	32.1	229	9.3	121	4.9	419	17.1	1,556	63.4
Sex										
Male	561	26.8	191	9.1	103	4.9	255	12.2	1,110	53.0
Female	226	63.1	38	10.6	18	5.0	164	45.8	446	124.5
Race/ethnicity										
White, non-Hispanic	312	21.1	148	10.0	64	4.3	150	10.2	674	45.7
Black, non-Hispanic	364	65.2	56	10.0	44	7.9	202	36.2	666	119.3
Other	111	26.4	25	5.9	13	3.1	67	15.9	216	51.4
Age										
<20	85	47.7	33	18.5	24	13.5	52	29.2	194	109.0
20-24	313	38.1	115	14.0	57	6.9	174	21.2	659	80.2
25-29	155	29.2	40	7.5	23	4.3	86	16.2	304	57.3
30-34	125	33.3	25	6.7	9	2.4	51	13.6	210	56.0
35-39	68	22.2	10	3.3	5	1.6	36	11.8	119	38.8
40-44	23	14.1	3	1.8	1	0.6	11	6.7	38	23.3
45+	18	22.6	3	3.8	2	2.5	9	11.3	32	40.3
Rank										
Enlisted	734	35.8	197	9.6	110	5.4	393	19.2	1,434	69.9
Officer	53	13.2	32	8.0	11	2.7	26	6.5	122	30.3
Cold year (Jul-Jun)										
2002-2003	183	37.7	62	12.8	35	7.2	101	20.8	381	78.6
2003-2004	174	35.3	49	9.9	27	5.5	74	15.0	324	65.8
2004-2005	166	33.9	43	8.8	18	3.7	85	17.4	312	63.7
2005-2006	110	22.7	38	7.8	15	3.1	72	14.8	235	48.4
2006-2007	154	30.7	37	7.4	26	5.2	87	17.3	304	60.6

*Rate per 100,000 person-years

Table 2. Incident primary diagnoses of cold injuries, by type, active components, U.S. Navy, July 2002-June 2007

	Frostbite		Immersion Foot		Hypothermia		Unspecified		Any cold	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	60	3.3	32	1.8	57	3.2	23	1.3	172	9.5
Sex										
Male	55	3.6	30	1.9	51	3.3	17	1.1	153	9.9
Female	5	1.9	2	0.8	6	2.3	6	2.3	19	7.3
Race/ethnicity										
White, non-Hispanic	29	2.7	24	2.2	38	3.6	10	0.9	101	9.4
Black, non-Hispanic	17	5.1	3	0.9	8	2.4	4	1.2	32	9.5
Other	14	3.5	5	1.2	11	2.7	9	2.2	39	9.7
Age										
<20	7	5.7	7	5.7	2	1.6	5	4.1	21	17.0
20-24	24	4.0	13	2.2	26	4.3	8	1.3	71	11.8
25-29	14	3.7	6	1.6	14	3.7	5	1.3	39	10.2
30-34	8	3.0	2	0.8	8	3.0	5	1.9	23	8.7
35-39	3	1.3	2	0.8	3	1.3	0	0	8	3.4
40-44	2	1.5	1	0.8	3	2.3	0	0	6	4.6
45+	2	3.1	1	1.5	1	1.5	0	0	4	6.1
Rank										
Enlisted	53	3.4	31	2.0	49	3.2	22	1.4	155	10.1
Officer	7	2.6	1	0.4	8	3.0	1	0.4	17	6.3
Cold year (Jul-Jun)										
2002-2003	22	5.8	7	1.9	8	2.1	1	0.3	38	10.1
2003-2004	14	3.7	10	2.7	8	2.1	7	1.9	39	10.4
2004-2005	5	1.4	3	0.8	16	4.4	4	1.1	28	7.7
2005-2006	4	1.1	5	1.4	8	2.3	7	2.0	24	6.8
2006-2007	15	4.4	7	2.1	17	5.0	4	1.2	43	12.7

*Rate per 100,000 person-years

Table 3. Incident primary diagnoses of cold injuries, by type, active components, U.S. Air Force, July 2002-June 2007

	Frostbite		Immersion Foot		Hypothermia		Unspecified		Any cold	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	180	10.1	37	2.1	48	2.7	48	2.7	313	17.5
Sex										
Male	147	10.2	30	2.1	39	2.7	37	2.6	253	17.6
Female	33	9.4	7	2.0	9	2.6	11	3.1	60	17.1
Race/ethnicity										
White, non-Hispanic	116	9.1	24	1.9	35	2.8	29	2.3	204	16.1
Black, non-Hispanic	41	15.2	10	3.7	9	3.3	14	5.2	74	27.5
Other	23	9.2	3	1.2	4	1.6	5	2.0	35	14.0
Age										
<20	18	18.7	5	5.2	6	6.2	10	10.4	39	40.5
20-24	82	15.4	15	2.8	27	5.1	21	3.9	145	27.2
25-29	34	8.8	7	1.8	3	0.8	10	2.6	54	13.9
30-34	16	6.0	3	1.1	4	1.5	4	1.5	27	10.2
35-39	15	5.6	6	2.3	3	1.1	1	0.4	25	9.4
40-44	10	5.7	1	0.6	2	1.1	2	1.1	15	8.5
45+	5	7.5	0	0	3	4.5	0	0	8	12.0
Rank										
Enlisted	160	11.2	34	2.4	45	3.2	41	2.9	280	19.6
Officer	20	5.5	3	0.8	3	0.8	7	1.9	33	9.1
Cold year (Jul-Jun)										
2002-2003	30	8.3	8	2.2	13	3.6	8	2.2	59	16.2
2003-2004	44	11.8	5	1.3	9	2.4	6	1.6	64	17.1
2004-2005	45	12.3	8	2.2	6	1.7	11	3.0	70	19.2
2005-2006	19	5.5	9	2.6	12	3.5	14	4.0	54	15.5
2006-2007	42	12.3	7	2.1	8	2.4	9	2.6	66	19.4

*Rate per 100,000 person-years

Table 4. Incident primary diagnoses of cold injuries, by type, active components, U.S. Marine Corps, July 2002-June 2007

	Frostbite		Immersion Foot		Hypothermia		Unspecified		Any cold	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Total	82	9.3	88	9.9	79	8.9	30	3.4	279	31.5
Sex										
Male	70	8.4	81	9.7	72	8.7	26	3.1	249	29.9
Female	12	22.3	7	13.0	7	13.0	4	7.5	30	55.8
Race/ethnicity										
White, non-Hispanic	46	8.0	60	10.5	41	7.2	17	3.0	164	28.6
Black, non-Hispanic	21	19.5	9	8.3	12	11.1	5	4.6	47	43.6
Other	15	7.3	19	9.3	26	12.7	8	3.9	68	33.1
Age										
<20	29	22.8	36	28.3	26	20.4	9	7.1	100	78.6
20-24	38	9.0	43	10.2	39	9.3	17	4.0	137	32.6
25-29	6	3.9	8	5.3	10	6.6	4	2.6	28	18.4
30-34	5	5.9	1	1.2	3	3.5	0	0	9	10.6
35-39	3	5.0	0	0	0	0	0	0	3	5.0
40-44	0	0	0	0	1	3.5	0	0	1	3.5
45+	1	8.2	0	0	0	0	0	0	1	8.2
Rank										
Enlisted	65	8.2	81	10.2	73	9.2	28	3.5	247	31.2
Officer	17	18.1	7	7.5	6	6.4	2	2.1	32	34.0
Cold year (Jul-Jun)										
2002-2003	23	13.2	23	13.2	16	9.2	2	1.2	64	36.7
2003-2004	11	6.2	19	10.7	22	12.4	4	2.3	56	31.6
2004-2005	15	8.5	20	11.3	25	14.1	19	10.7	79	44.6
2005-2006	7	3.9	9	5.1	11	6.2	0	0	27	15.2
2006-2007	26	14.5	17	9.5	5	2.8	5	2.8	53	29.6

*Rate per 100,000 person-years

(and junior enlisted) members **(Tables 1,4).** Of note, among soldiers and Marines, hypothermia rates were more than twice as high among those younger than 20 as those 20-24 years old **(Tables 1, 4).** In all Services, rates of "frostbite" were higher among black service members than their counterparts **(Tables 1-4);** and in all Services except the Navy, rates of cold injuries overall were significantly higher among black service members than their counterparts **(Tables 1-4).**

Service members stationed in Korea, Europe, and at 11 installations in the continental United States and Alaska accounted for the more than half of all cold injuries among active component members during the 5-year period **(Table 5).** Service members assigned to Fort Wainwright, Alaska, accounted for approximately 12% of cold injuries during the past year (and 9% during the entire surveillance period) **(Table 5).** One Air Force base (Elmendorf, Alaska) and two Marine Corps installations (Quantico, Virginia, and San Diego, California) were among the top ten U.S installations in relation to rates of cold injuries overall during the surveillance period **(Table 5).**

Editorial comment:

In general, during the past cold season, rates of cold injuries among U.S. service members were slightly higher than in the previous year, but similar to rates of recent prior years. During the past five years, rates of cold injuries have been generally declining in the Army (particularly, frostbite and immersion foot) and relatively stable in the other Services.

As in the past, the largest numbers and highest rates of cold injuries by far are reported from the Army. This likely reflects differences in the natures, locations, and circumstances of the training and operations of the Services as well as differences in ascertainment of cold injury cases across the Services (e.g., records of medical encounters during field exercises, deployment operations, and aboard Navy ships are not routinely available for health surveillance purposes).

This report documents that, in the Army and Marine Corps, the youngest, the most junior, and female enlisted service members have higher rates of cold injuries—particularly "frostbite"—than their counterparts. In the Army and the Air Force, black service members have significantly higher rates of cold injuries overall. Other reports have documented that African American soldiers and individuals with cold injuries in the past have increased susceptibilities to cold injuries during prolonged or intense cold exposures.[4] Special vigilance by individuals, line supervisors, commanders, and medical staffs is indicated to prevent cold injuries among those with known or suspected increased susceptibilities.

Commanders and supervisors at all levels should

Table 5. Installations (with at least 30 total cases) with the highest incident rates of any cold injury, U.S. Armed Forces, July 2002-June 2007

Assigned location	2002-2003		2003-2004		2004-2005		2005-2006		2006-2007		Total	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Ft. Wainwright, AK	46	1006.8	65	1554.3	21	497.8	15	331.8	56	921.0	203	861.3
Ft. Richardson, AK	7	308.5	25	828.7	12	335.5	28	540.1	11	197.6	83	423.2
Aberdeen, MD	11	368.6	6	206.4	4	143.9	3	103.3	15	384.1	39	251.9
Ft. Drum, NY	38	330.5	7	60.4	48	342.0	14	87.5	12	70.8	119	169.8
MCRD San Diego, CA	5	99.4	8	158.4	6	114.9	5	95.4	13	240.3	37	142.6
MCB Quantico, VA	12	149.5	11	154.5	5	71.1	5	73.3	12	180.4	45	126.2
Elmendorf AFB, AK	3	45.3	11	161.6	12	177.9	5	76.8	8	126.9	39	118.2
Ft. Lee, VA	9	161.8	2	38.1	11	218.2	5	88.7	5	79.7	32	115.3
Korea	44	110.9	39	95.9	24	65.2	29	97.5	33	123.0	169	97.3
Ft. Leonard Wood, MO	7	67.1	6	55.7	17	173.5	3	27.8	11	95.6	44	82.6
Ft. Knox, KY	1	11.3	12	144.1	7	88.2	8	100.4	6	73.3	34	82.4
Ft. Sill, OK	7	54.6	11	86.2	10	84.7	6	52.5	13	97.4	47	75.6
Ft. Jackson, SC	10	107.7	8	83.0	4	44.7	3	32.7	8	78.2	33	69.8
Ft. Bragg, NC	48	114.0	34	79.2	16	37.5	21	49.8	11	25.2	130	60.9
Ft. Riley, KS	4	38.9	2	18.6	10	95.8	4	37.3	11	85.4	31	56.3
Ft. Benning, GA	7	37.1	8	41.2	15	77.5	8	40.2	6	30.8	44	45.4
Ft. Lewis, WA	12	61.7	10	50.7	8	37.6	5	20.3	13	55.3	48	44.2
Ft. Campbell, KY	14	55.9	5	19.5	17	61.6	4	13.5	19	64.3	59	42.9
Europe	44	62.4	16	23.0	33	45.1	20	31.3	16	26.1	129	38.1
Camp LeJeune, NC	18	66.6	8	24.2	13	39.0	2	5.7	6	21.0	47	29.9
Camp Pendleton, CA	6	18.0	10	27.6	16	43.8	3	7.9	3	9.1	38	21.5
Ft. Hood, TX	13	30.8	4	9.3	3	6.8	8	17.8	10	19.4	38	16.8

*Rate per 100,000 person-years

implement appropriate countermeasures to prevent cold injuries, including proper clothing and equipment, wind chill temperature monitoring and awareness training.[3] Service members who train in wet and freezing conditions should know the signs of cold injury, obtain adequate hydration, and avoid tobacco, caffeine and vasoconstrictive medications.[3] Up-to-date cold injury prevention materials (including posters, presentation outlines, policies, regulations, and technical bulletins) are available online: http://chppm-www.apgea.army.mil/coldinjury/

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Update: Deployment Health Assessments, U.S. Armed Forces, January 2003-September 2007

The health protection strategy of the U.S. Armed Forces is designed to deploy healthy, fit, and medically ready forces, to minimize illnesses and injuries during deployments, and to evaluate and treat physical and psychological problems (and deployment-related health concerns) following deployment.

In 1998, the Department of Defense initiated health assessments of all deployers prior to and after serving in major operations outside of the United States.[1] In March 2005, the Post-Deployment Health Reassessment (PDHRA) program was begun to identify and respond to health concerns that persisted for or emerged within three to six months after return from deployment.[2]

This report summarizes responses to selected questions on deployment health assessments completed since 2003. In addition, it documents the natures and frequencies of changes in responses from before to after deployments.

Methods:

Completed deployment health assessment forms are transmitted to the Armed Forces Health Surveillance Center (AFHSC) where they are incorporated into the Defense Medical Surveillance System (DMSS).[3] In the DMSS, data recorded on health assessment forms are integrated with data that document demographic and military characteristics and medical encounters (e.g., hospitalizations, ambulatory visits) at fixed military and other (contracted care) medical facilities of the Military Health System. For this analysis, DMSS was searched to identify all pre (DD2795) and post (DD2796) deployment health assessment forms completed since 1 January 2003 and all post-deployment health reassessment (DD2900) forms completed since 1 August 2005.

Results:

Since January 2003, 1,766,069 pre-deployment health assessment forms, 1,768,819 post-deployment health assessment forms, and 408,640 post-deployment health reassessment forms were completed at field sites, transmitted to the AFHSC, and integrated into the DMSS **(Figure 1)**. Throughout the period, there were intervals of approximately 2-4 months between peaks of pre-deployment and post-deployment health assessments (that were completed by different cohorts of deployers) **(Figure 1)**. Post-deployment health reassessments rapidly increased between February and May 2006 **(Figure 1)**. Since then, numbers of reassessment forms per month have been relatively stable (reassessment forms per month, October 2006-September 2007: mean: 21,826; range: 12,302-28,433) **(Figure 1, Table 1)**.

Between October 2006 and September 2007, nearly three-

Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-September 2007

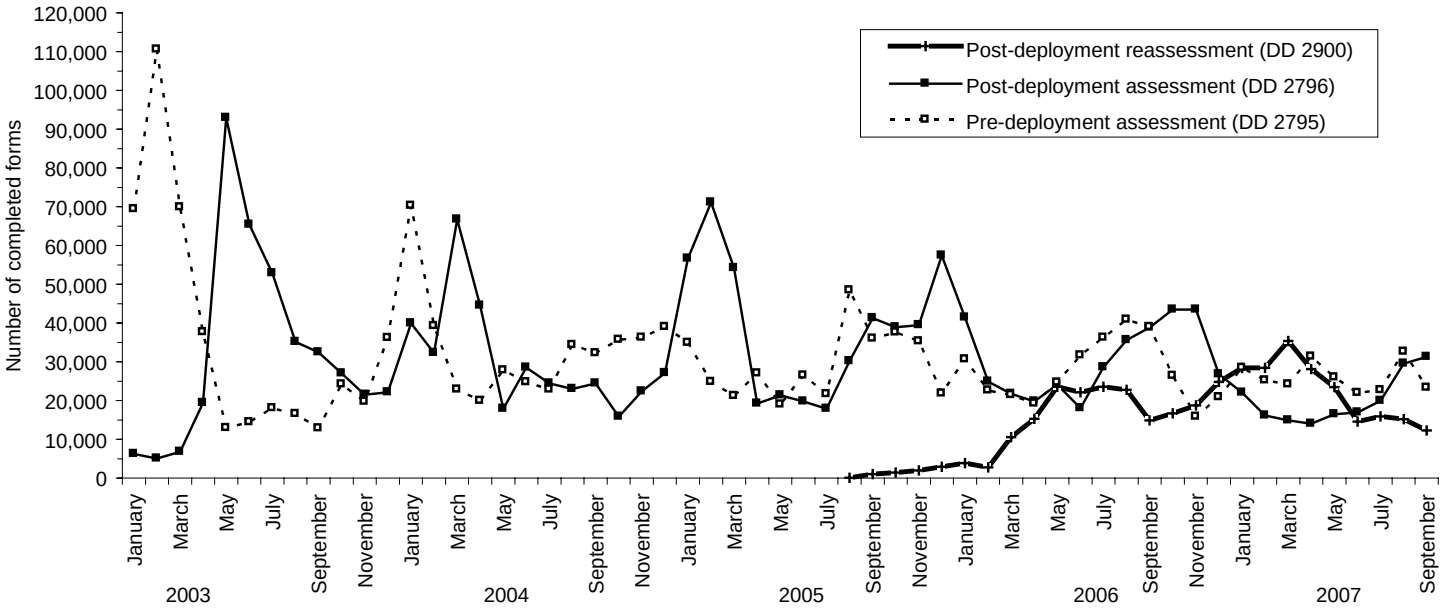


Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, October 2006-September 2007

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**298,755**	**100**	**294,865**	**100**	**261,909**	**100**
2006						
October	26,387	8.8	43,436	14.7	16,700	6.4
November	15,843	5.3	43,442	14.7	18,740	7.2
December	20,854	7.0	26,762	9.1	24,775	9.5
2007						
January	28,411	9.5	22,012	7.5	28,433	10.9
February	25,207	8.4	16,179	5.5	28,407	10.8
March	24,186	8.1	14,877	5.0	35,321	13.5
April	31,323	10.5	13,990	4.7	28,121	10.7
May	26,007	8.7	16,467	5.6	23,450	9.0
June	21,976	7.4	16,931	5.7	14,602	5.6
July	22,693	7.6	19,960	6.8	15,876	6.1
August	32,572	10.9	29,542	10.0	15,182	5.8
September	23,296	7.8	31,267	10.6	12,302	4.7

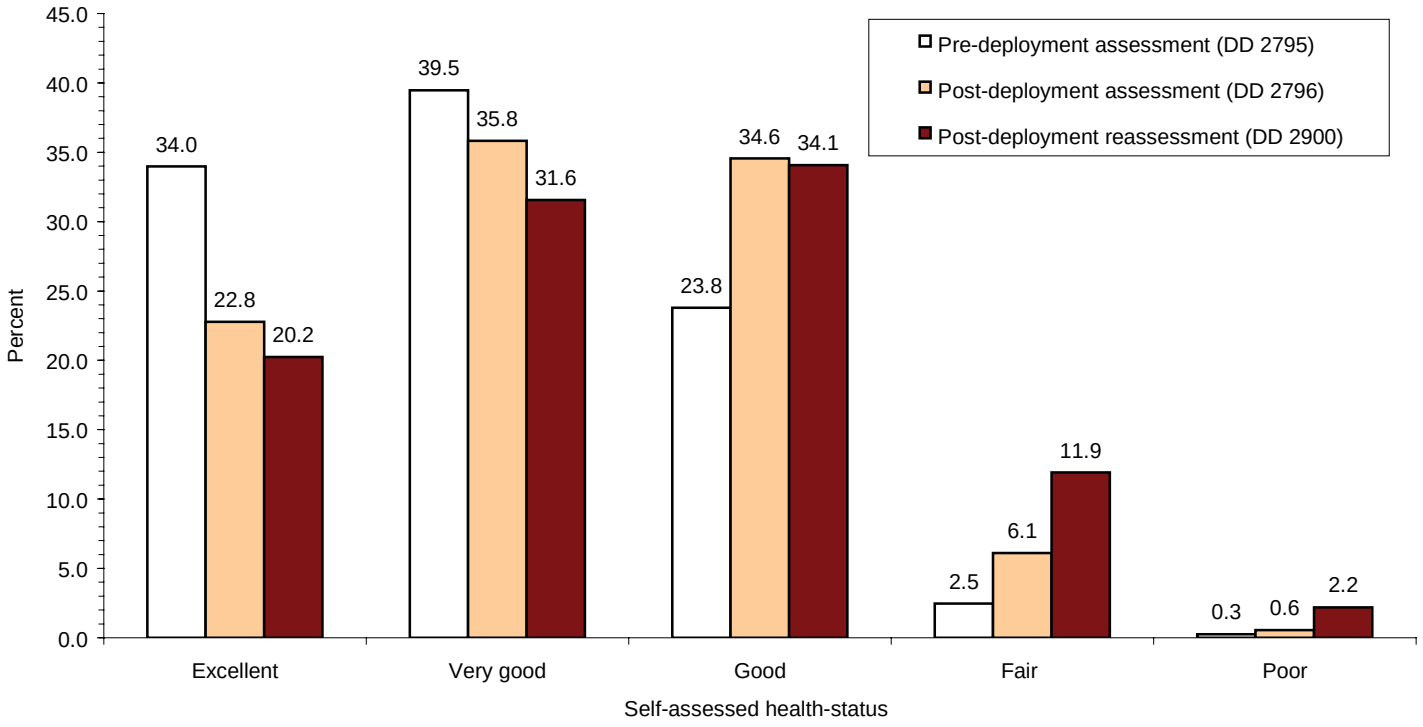
fourths (73.5%) of deployers rated their "health in general" as "excellent" or "very good" during pre-deployment health assessments **(Figure 2).** During the same period, only 58.6% and 51.8% of redeployers rated their general health as "excellent" or "very good" during post-deployment assessments and post-deployment reassessments, respectively **(Figure 2).**

From pre-deployment to post-deployment to post-deployment reassessments, there were sharp increases in the proportions of deployers who rated their health as "fair" or "poor" **(Figure 2).** For example, prior to deployment, approximately one of 40 (2.8%) deployers rated their health as "fair" or "poor"; however, 3-6 months after redeploying (during post-deployment reassessments), approximately one of seven (14.1%) respondents rated their health as "fair" or "poor" **(Figure 2).**

From January 2003 through September 2007, the proportion of deployers who assessed their general health as "fair" or "poor" before deploying remained consistently low (% "fair" or "poor" "health in general," pre-deployment health assessments, January 2003-September 2007, by month: mean: 2.4% [range: 1.5-3.8%]) **(Figure 3).** During the same period, the proportion of redeployers who assessed their general health as "fair" or "poor" around times of redeployment was consistently and clearly higher than before deploying (% "fair" or "poor" "health in general," post-deployment health assessments, January 2003-September 2007, by month: mean: 7.0% [range: 3.0-10.2%]) **(Figure 3).** Finally, from January 2006 through September 2007, the proportion of redeployers who assessed their general health as "fair" or "poor" 3-6 months after redeploying was sharply higher than at redeployment (% "fair" or "poor" "health in general," post-deployment health reassessments, January 2006-September 2007, by month: mean: 13.7% [range: 11.9-17.2%]) **(Figure 3).**

More than half of service members who rated their overall health before deployment chose a different descriptor after

Figure 2. Percent distributions of self-assessed health status as reported on deployment health assesment forms, U.S. Armed Forces, October 2006-September 2007



deploying, but usually by a single category (on a five category scale). The proportions of deployers whose self-rated health improved by more than one category from pre-deployment to reassessment remained relatively stable between October 2006 and September 2007 (mean: 1.4%, range:1.1-1.7%) **(Figure 4).** The proportions of service members whose self-assessed health declined by more than one category increased between October 2006 and March 2007, declined between March and May 2007, and has been stable since May 2007 (mean: 16.3, range 14.1-19.0%) **(Figure 4).**

In general, on post-deployment assessments and reassessments, members of Reserve components and members of the Army were much more likely than their respective counterparts to report mental health-related symptoms and health and exposure-related concerns – and in turn, to have indications for medical and mental health follow-ups ("referrals") **(Table 2).**

Among Reserve versus active component members, relative excesses of health-related concerns and provider-indicated referrals were much greater 3-6 months after redeployment (DD2900) than either before deploying (DD2795) or at redeployment (DD2796) **(Table 2, Figures 5,6).** For example, among both active and Reserve component members of all Services, mental or behavioral health referrals were more common after deployment than before **(Figure 5).** However, from the time of redeployment to 3-6 months later, mental health referrals sharply increased among active and Reserve component members of the Army, Navy, and Marine Corps (but not Air Force) **(Table 2, Figure 5).** Of note in this regard, the largest absolute increase in mental health referrals from redeployment to 3-6 months later was for Reserve component members of the Army (post-deployment: 4.7%; reassessment: 13.2%) **(Table 2, Figure 5).**

Finally, over the past three years, Reserve component members have been approximately twice as likely as active to report "exposure concerns" on post-deployment health assessments (DD2796) (%"exposure concerns," post-deployment assessments, by month, October 2004-September 2007: Reserve: mean: 26.3%, range: 19.2-33.1%; active: mean: 12.7%; range: 7.3-20.0%) **(Figures 6,7).** Sharply higher proportions of both Reserve and active component members endorsed exposure concerns 3-6 months after (DD2900) compared to around times (DD2796) of redeployment (%"exposure concerns," post-deployment reassessments, by month, January 2006-September 2007: Reserve: mean: 37.8%, range: 30.1-48.3%; active: mean: 19.1%; range: 16.7-23.6%) **(Figure 7).**

Editorial comment:

In general, since 2003, proportions of U.S. deployers to Iraq and Afghanistan who report medical or mental health-related symptoms (or have indications for medical or mental health referrals) on deployment-related health assessments increased from pre-deployment to post-deployment to 3-6 months post-deployment, are higher among members of the Army than the other Services, and are higher among Reserve than the active

Figure 3. Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, January 2003-September 2007

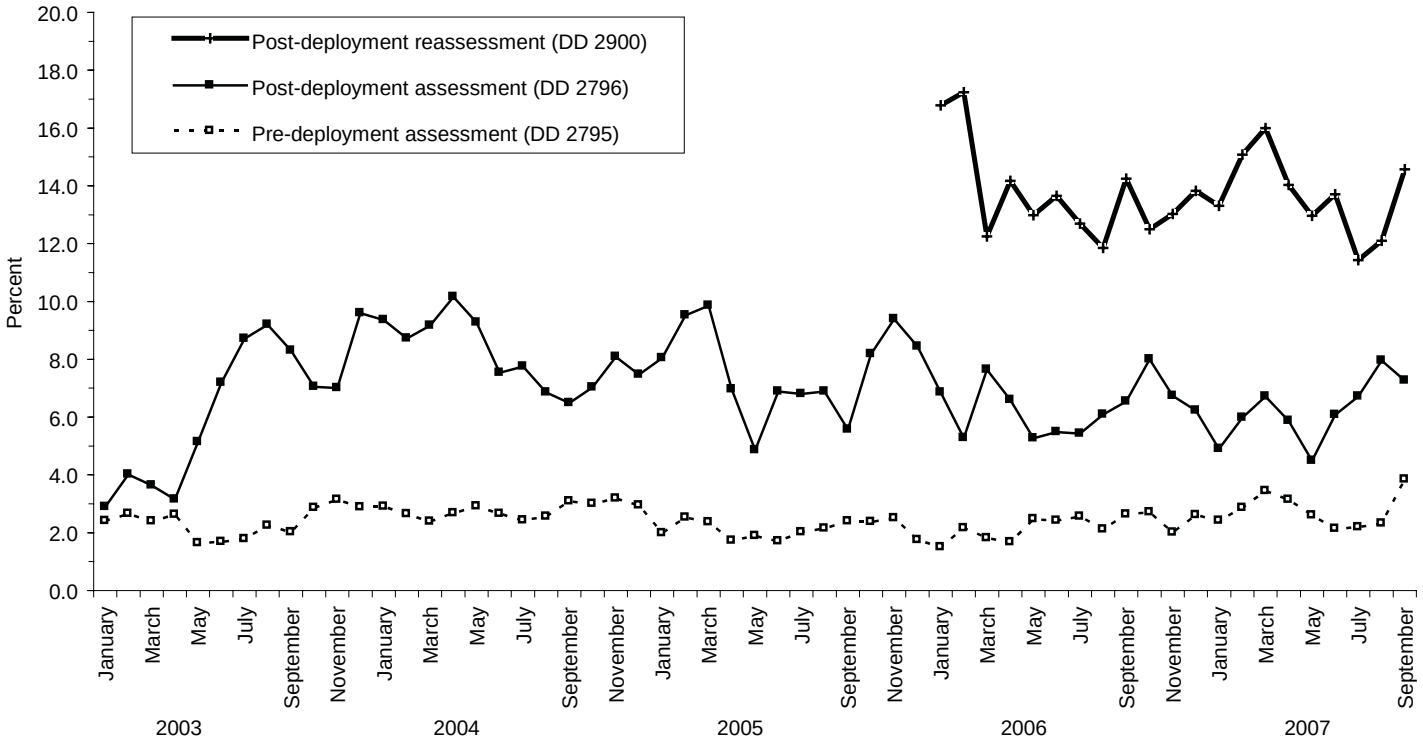


Figure 4. Proportion of service members whose self-assessed health status improved ("better") or declined ("worse") (by 2 or more categories on 5-category scale) from pre-deployment to reassessment, by month, U.S. Armed Forces, October 2006-September 2007

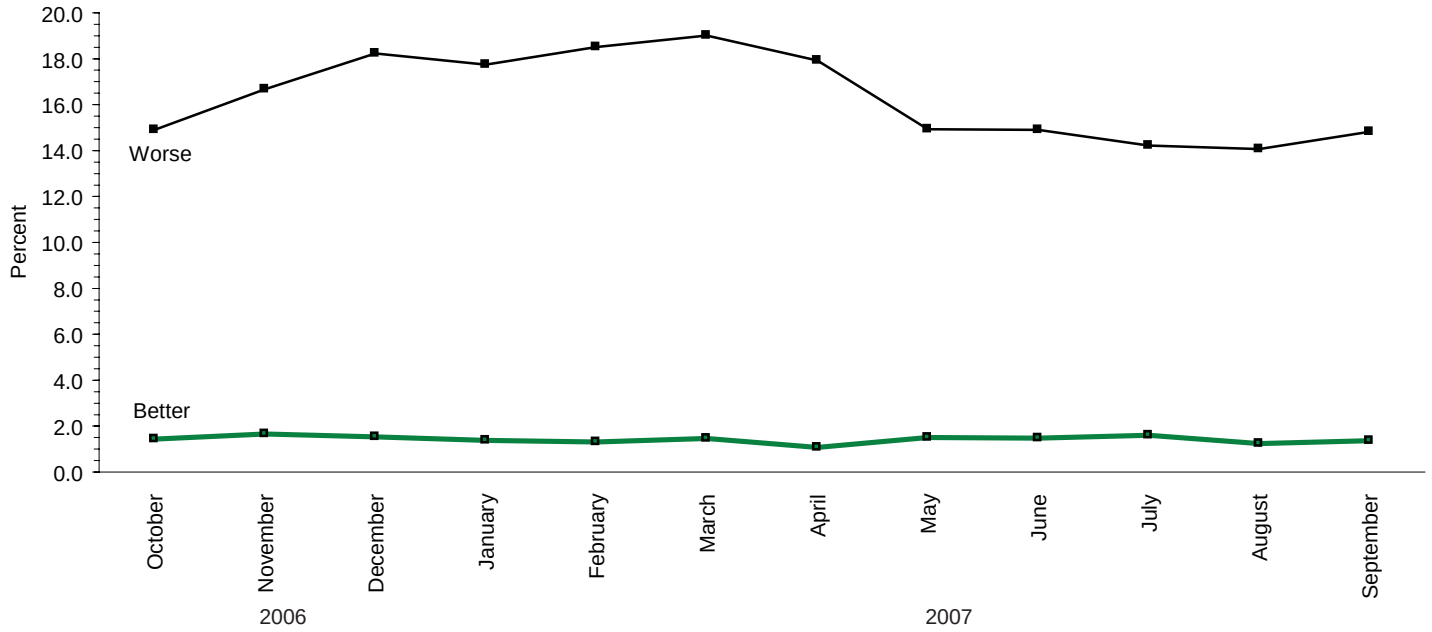
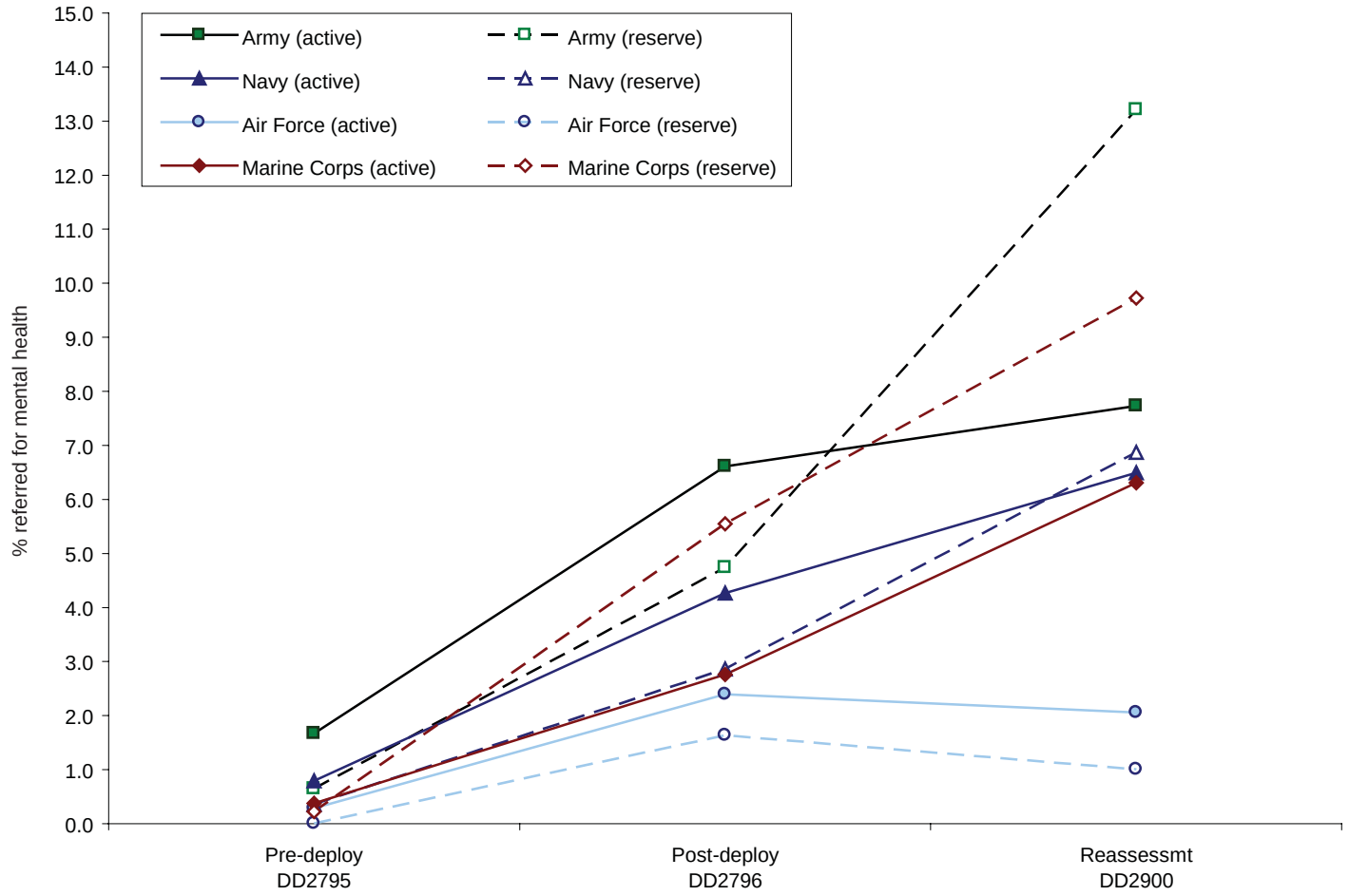


Figure 5. Percent of deployers with mental or behavioral health referrals, by Service and component, by timing of health assessment, U.S. Armed Forces, October 2006-September 2007



component members.

Regardless of the Service or component, deployers often rate their general health worse when they return compared to before deploying. This is not surprising because deployments are inherently physically and psychologically demanding. Clearly, there are many more – and more significant – threats to the physical and mental health of service members when they are conducting or supporting combat operations away from their families in hostile environments compared to when serving at their permanent duty stations (active component) or when living in their civilian communities (Reserve component).

However, many redeployed service members rate their general health worse 3-6 months after returning from deployment compared to earlier. This finding may be less intuitively understandable. Symptoms of post-traumatic stress disorder (PTSD) may emerge or worsen within several months after a life threatening experience (such as military service in a war zone). PTSD among U.S. veterans of combat duty in Iraq has been associated with higher rates of physical health problems after redeployment.[4] The post-deployment health reassessment at 3-6 months post-deployment is designed to detect service members with symptoms not only of PTSD but also persistent or emerging deployment-related medical and mental health problems.

Among British veterans of the Iraq war, Reservists reported more "ill health" than their active counterparts.[5] Roles, traumatic experiences, and unit cohesion while deployed were associated with medical outcomes after returning; however, PTSD symptoms were more associated with problems at home (e.g, reintegration into family, work, and other aspects of civilian life) than with events in Iraq.[5] The finding may explain, at least in part, the large differences in prevalences of mental health symptoms, medical complaints, and provider-indicated mental health referrals among Reserve compared to active members — particularly in the Army and Navy — 3-6 months after returning from deployment compared to earlier.

Post-deployment health assessments may be more reliable several months after redeployment compared to earlier. Commanders, supervisors, family members, peers, and providers of health care to redeployed service members should be alert to emerging or worsening symptoms of physical and psychological problems for several months, at least, after returning from deployment.

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Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, October 2006-September 2007

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
Active component	n=141834	n=129871	n=93,031	n=8,080	n=6,189	n=5,652	n=61,813	n=51,702	n=55,129	n=11,741	n=16,779	n=12,028	n=223,468	n=204,541	n=165,840
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	4.4	7.9	18.0	1.6	2.4	7.0	0.6	1.9	5.2	1.8	3.1	9.5	3.1	5.8	12.7
Health concerns, not wound or injury	13.1	23.1	41.4	5.9	10.1	21.8	4.5	13.6	16.3	4.1	8.5	25.0	10.0	19.1	31.2
Health worse now than before deployed	na	20.8	28.4	na	8.8	14.6	na	7.6	10.5	na	11.7	18.6	na	16.3	21.3
Exposure concerns	na	20.1	25.5	na	8.9	13.3	na	5.9	12.2	na	7.0	15.4	na	15.1	19.9
PTSD symptoms (2 or more)	na	15.9	17.3	na	6.2	9.5	na	2.6	3.0	na	7.9	12.5	na	11.6	12.0
Depression symptoms	na	29.9	10.4	na	19.9	7.8	na	8.8	2.8	na	25.1	9.5	na	23.8	7.7
Referral indicated by provider (any)	7.9	28.1	25.3	6.8	18.2	20.5	1.6	13.2	8.0	2.8	15.5	19.1	5.8	23.0	19.0
Mental health referral indicated*	1.7	6.6	7.7	0.8	4.3	6.5	0.3	2.4	2.1	0.4	2.8	6.3	1.2	5.2	5.7
Medical visit following referral†	94.2	99.3	98.6	92.5	87.1	89.6	78.2	94.9	96.0	54.6	75.3	80.9	92.4	97.2	96.5
	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
Reserve component	n=53,452	n=70,737	n=69,318	n=2,785	n=1,119	n=4,600	n=16,811	n=14,042	n=18,080	n=1,795	n=1,225	n=4,071	n=74,843	n=87,123	n=96,069
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health "fair" or "poor"	1.9	10.2	19.1	0.6	4.8	10.9	0.3	2.1	4.3	2.4	5.7	12.1	1.5	8.8	15.6
Health concerns, not wound or injury	13.6	36.7	57.8	3.4	21.9	42.6	1.7	22.7	17.4	4.5	27.6	43.0	10.4	34.1	48.8
Health worse now than before deployed	na	28.5	38.1	na	18.7	26.3	na	10.7	10.2	na	26.5	26.4	na	25.5	31.8
Exposure concerns	na	32.9	40.7	na	20.2	31.2	na	8.0	17.7	na	22.4	29.6	na	28.6	35.4
PTSD symptoms (2 or more)	na	13.3	23.6	na	6.3	14.5	na	2.0	3.3	na	19.1	21.2	na	11.5	19.2
Depression symptoms	na	27.1	12.5	na	15.3	8.7	na	7.7	2.5	na	37.1	9.5	na	24.0	10.3
Referral indicated by provider (any)	10.8	31.0	53.3	5.0	24.2	38.9	0.2	12.0	28.9	5.0	26.9	51.7	8.1	27.8	47.9
Mental health referral indicated*	0.6	4.7	13.2	0.4	2.9	6.9	0.0	1.6	1.0	0.2	5.6	9.7	0.5	4.2	10.5
Medical visit following referral†	98.3	97.8	27.6	96.2	91.0	26.7	16.7	54.7	23.4	41.7	47.8	18.6	97.7	93.1	26.4

*Includes behavioral health, combat stress and substance abuse referrals
†Record of inpatient or outpatient visit within 6 months after referral

Figure 6. Ratio of percents of deployers who endorse selected questions, Reserve versus active component, on pre-deployment health assessments (DD2795) and post-deployment health reassessments (DD2900), U.S. Armed Forces, October 2006-September 2007

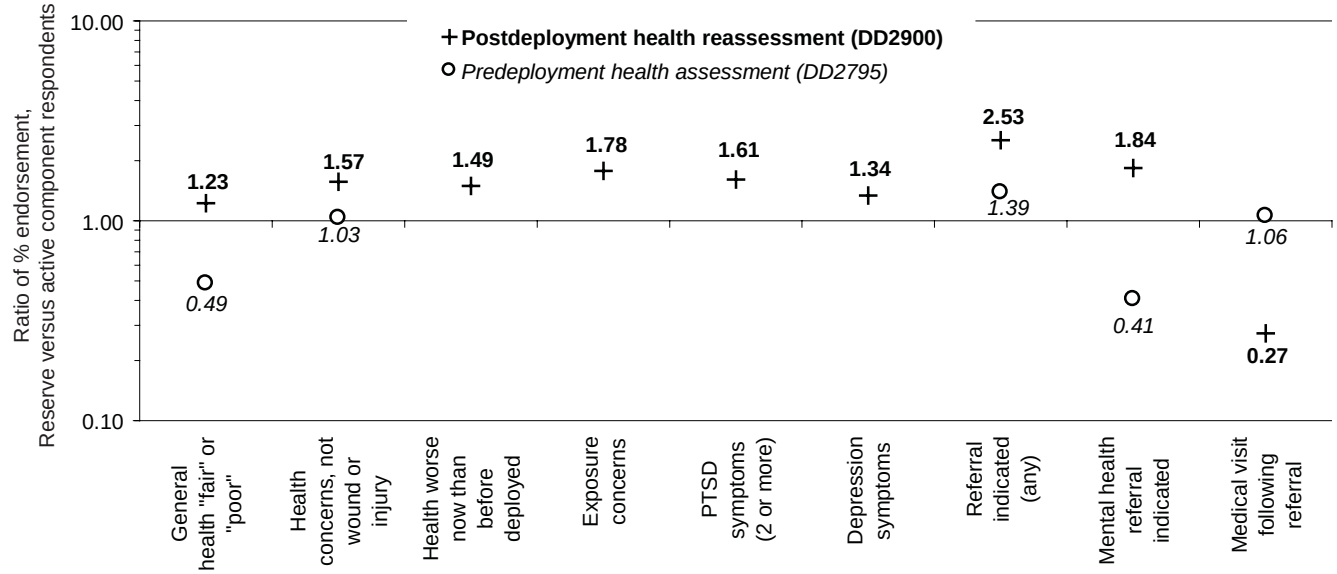
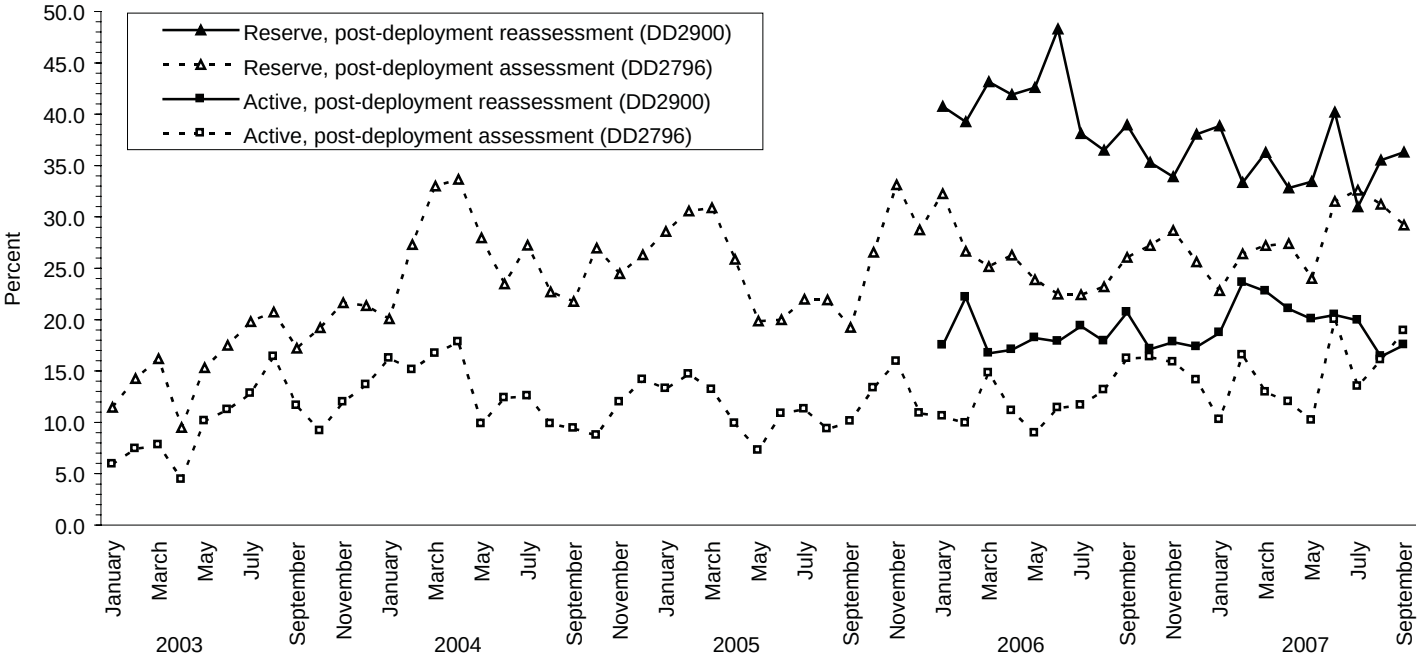
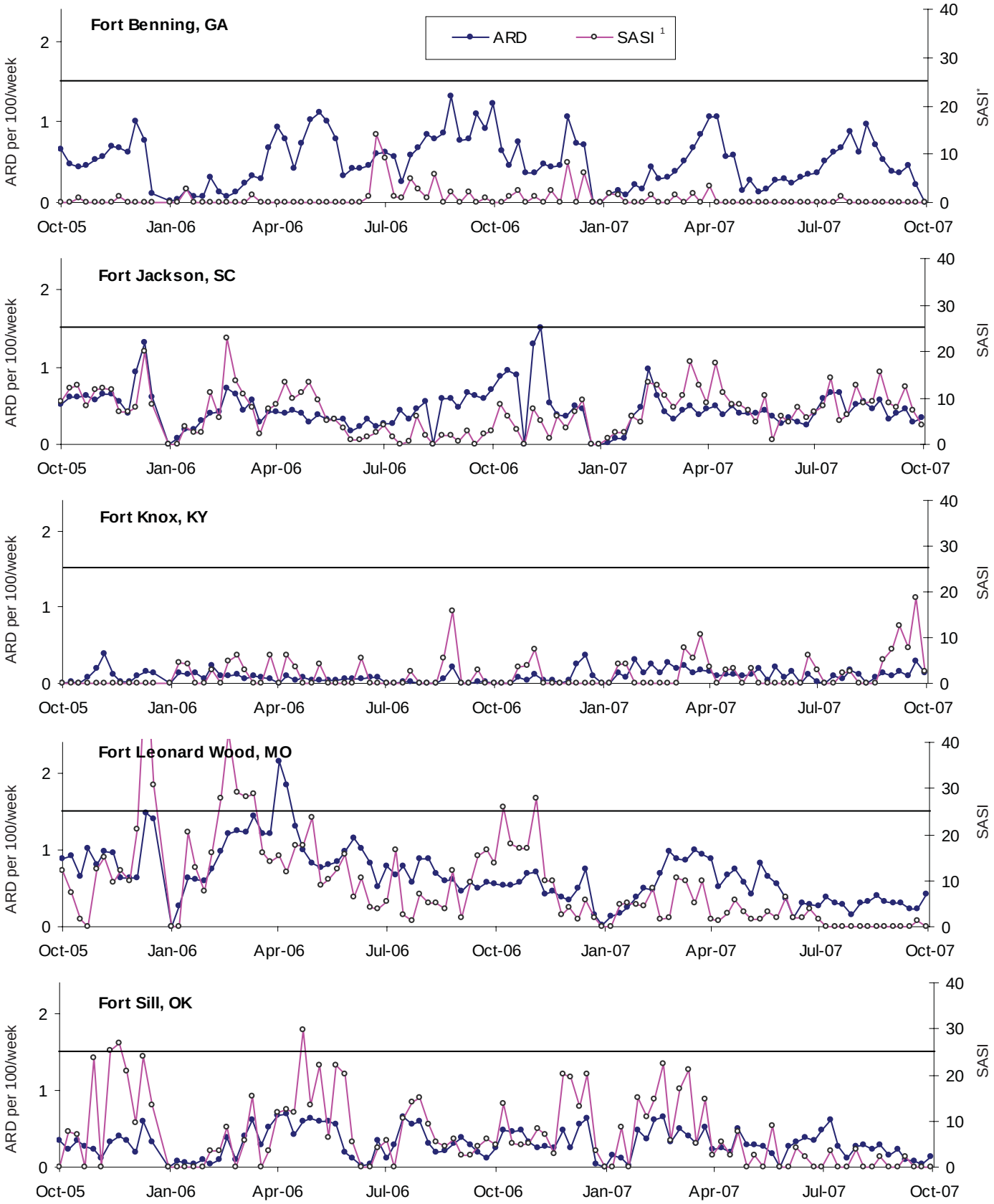


Figure 7. Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2003-September 2007



Acute respiratory disease (ARD) and streptococcal pharyngitis rates (SASI*), basic combat training centers, U.S. Army, by week, October 2005-October 2007



* Streptococcal-ARD surveillance index (SASI) = ARD rate x % positive culture for group A streptococcus
ARD rate = cases per 100 trainees per week
ARD rate ≥ 1.5 or SASI ≥ 25.0 for 2 consecutive weeks are surveillance indicators of epidemics

Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers,* January-September 2006 and January-September 2007

Air Force

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Air Combat Cmd	671	1,069	1	2	.	1	2	6	.	.	.	.	1	6	2	6
Air Education & Training Cmd	295	528	.	1	1	.	7	13	.	3	.	.	1	4	3	9
Lackland, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	83	39	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	32	19	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Air Force Materiel Cmd	314	408	1	.	1	2	2	16	.	2	.	.	2	.	2	1
Air Force Special Ops Cmd	71	115	.	.	.	.	3	.	5	1	.	.	.	.	.	.
Air Force Space Cmd	209	209	.	2	.	1	3	6	.	1	.	.	1	2	.	1
Air Mobility Cmd	456	522	.	1	3	1	5	10	8	2	.	.	4	4	1	2
Pacific Air Forces	315	394	.	1	1	1	5	4	.	1	.	.	2	4	.	10
PACAF Korea	111	63	.	.	.	.	.	.	.	.	.	.	.	.	.	1
U.S. Air Forces in Europe	204	210	.	3	1	.	.	.	.	1	.	.	.	.	2	.
Total	**2,761**	**3,576**	**2**	**10**	**7**	**6**	**27**	**57**	**13**	**12**	**0**	**0**	**11**	**20**	**10**	**30**

*Events reported by October 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Air Combat Cmd	1	9	.	.	599	668	40	56	3	1	.	3	3	.	1	6
Air Education & Training Cmd	.	2	1	.	216	416	32	51	1	.	.	.	.	.	.	.
Lackland, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	.	.	1	.	38	33	.	2	.	.	.	.	2	.	1	.
Air Force Dist. of Washington	.	.	.	.	23	17	3	1	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	.	5	1	1	210	326	40	39	1	1	.	.	.	.	.	.
Air Force Special Ops Cmd	.	.	.	.	47	101	14	13	.	.	.	.	.	.	.	.
Air Force Space Cmd	1	1	.	.	166	178	6	12	.	.	.	.	1	.	.	.
Air Mobility Cmd	6	5	1	.	342	436	18	32	1	1	.	.	.	.	.	3
Pacific Air Forces	.	2	2	.	270	327	21	21	.	.	.	.	2	.	.	.
PACAF Korea	.	.	.	.	91	51	12	1	.	2	.	.	.	.	.	.
U.S. Air Forces in Europe	2	2	1	.	134	162	15	13	1	.	.	.	.	.	.	.
Total	**10**	**26**	**7**	**1**	**2,136**	**2,715**	**201**	**241**	**7**	**5**	**0**	**3**	**8**	**0**	**2**	**9**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers,* January-September 2006 and January-September 2007

Army

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	220	226	4	.	3	3	2	6	.	1	.	.	1	6	.	1
Aberdeen, MD	11	19	.	.	.	1	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	282	197	11	8	.	2	9	5	2	3	.	.	.	.	5	1
FT Bragg, NC	1,358	1,006	10	2	.	.	19	18	.	2	.	.	.	.	.	.
FT Drum, NY	171	176	.	.	.	.	.	.	.	.	.	.	.	2	.	.
FT Eustis, VA	191	156	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	238	208	.	2	2	.	.	2	1	1	.	.	.	2	.	.
FT Lee, VA	279	287	.	.	.	1	.	1	.	1	.	.	.	2	.	1
FT Meade, MD	92	67	.	.	.	.	2	1	.	.	.	.	.	.	.	.
West Point, NY	51	31	.	.	.	.	1	.	.	.	.	.	3	3	.	.
GREAT PLAINS																
FT Sam Houston, TX	431	442	.	.	2	1	9	4	2	.	.	.	1	4	1	6
FT Bliss, TX	264	205	.	.	1	.	1	.	.	.	.	.	4	2	.	.
FT Carson, CO	653	520	1	3	3	3	4	1	.	.	.	.	.	.	.	.
FT Hood, TX	1,355	1,682	4	10	1	3	10	9	10	9	.	.	.	.	1	1
FT Huachuca, AZ	73	87	.	1	.	.	11	6	.	.	.	.	.	.	.	.
FT Leavenworth, KS	36	45	.	1	2	.	.	.	.	2	.	.	.	.	.	.
FT Leonard Wood, MO	258	310	.	.	5	1	2	1	.	1	.	.	.	.	6	11
FT Polk, LA	208	191	2	.	1	3	1	5	.	.	.	.	.	.	.	1
FT Riley, KS	185	285	2	2	.	.	.	5	.	.	.	.	.	.	.	2
FT Sill, OK	193	150	.	.	.	.	1	2	.	.	.	.	.	.	2	1
SOUTHEAST																
FT Gordon, GA	369	555	.	.	.	.	.	5	.	.	.	.	11	1	1	.
FT Benning, GA	386	297	2	1	1	1	12	3	1	1	.	.	.	1	.	1
FT Campbell, KY	550	587	1	1	.	.	1	.	.	2	.	.	.	.	.	.
FT Jackson, SC	215	265	.	.	.	.	.	.	.	.	.	.	1	1	.	.
FT Rucker, AL	69	75	1	.	.	.	3	1	.	13	.	.	.	1	.	.
FT Stewart, GA	731	832	.	2	.	.	7	19	5	9	.	.	8	2	3	2
WESTERN																
FT Lewis, WA	470	598	.	3	.	4	5	1	.	1	.	.	1	.	1	1
FT Irwin, CA	87	77	.	1	.	.	.	2	.	1	.	.	.	.	.	.
FT Wainwright, AK	156	221	.	1	.	.	3	1	.	1	.	.	.	.	.	.
OTHER LOCATIONS																
Hawaii	786	585	33	22	1	2	10	12	1	.	.	.	.	1	1	.
Germany	687	666	11	6	1	1	17	7	.	8	.	.	1	.	1	1
Korea	519	498	.	.	.	.	.	.	.	.	.	.	3	.	5	2
Total	**11,574**	**11,546**	**82**	**66**	**23**	**26**	**130**	**117**	**22**	**56**	**0**	**0**	**34**	**28**	**27**	**32**

*Events reported by October 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers,* January-September 2006 and January-September 2007

Army

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NORTH ATLANTIC																
Washington, DC Area	1	11	2	4	127	126	21	19	2	5	1	.	.	.	.	.
Aberdeen, MD	.	.	.	.	8	10	1	3	.	.	.	.	.	.	.	.
FT Belvoir, VA	2	1	.	1	149	139	36	20	.	2	.	.	.	.	.	.
FT Bragg, NC	1	1	18	4	925	675	136	116	4	2	103	59	1	1	134	122
FT Drum, NY	.	2	.	2	154	116	17	23	.	.	.	.	.	.	.	.
FT Eustis, VA	.	1	.	.	126	127	37	8	.	.	.	.	.	.	19	10
FT Knox, KY	6	1	.	1	166	165	36	25	2	.	.	.	3	.	11	2
FT Lee, VA	.	3	.	.	212	221	37	28	.	2	.	.	.	1	3	12
FT Meade, MD	.	1	.	.	77	53	12	9	.	1	1	1	.	1	.	.
West Point, NY	16	14	.	.	21	11	.	.	.	.	.	.	1	.	2	.
GREAT PLAINS																
FT Sam Houston, TX	.	1	1	.	240	233	43	48	4	3	.	.	.	.	9	4
FT Bliss, TX	.	.	.	.	199	156	46	36	5	1	.	.	.	.	1	.
FT Carson, CO	.	.	.	1	461	363	78	51	.	1	31	10	.	1	.	.
FT Hood, TX	.	2	1	5	887	1,235	213	224	.	2	36	75	.	.	32	27
FT Huachuca, AZ	.	.	.	.	53	63	8	16	.	1	.	.	1	.	.	.
FT Leavenworth, KS	.	1	.	.	30	36	4	5	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	.	.	.	176	208	16	31	.	1	.	.	.	2	15	20
FT Polk, LA	.	.	.	15	111	92	33	29	2	1	.	.	.	.	58	43
FT Riley, KS	.	.	.	.	148	204	23	19	.	.	.	.	.	.	10	19
FT Sill, OK	.	.	.	1	51	78	20	19	2	2	.	.	.	1	58	34
SOUTHEAST																
FT Gordon, GA	.	1	.	.	263	401	57	75	.	4	3	.	.	.	4	6
FT Benning, GA	.	.	.	2	230	172	65	56	.	.	.	.	.	1	67	42
FT Campbell, KY	.	.	.	.	386	440	53	66	.	.	.	.	.	.	32	15
FT Jackson, SC	.	.	.	.	180	136	30	37	.	2	.	.	.	.	.	87
FT Rucker, AL	.	.	.	.	49	49	4	2	1	1	.	.	.	.	10	5
FT Stewart, GA	3	.	3	.	445	580	130	106	2	3	18	.	1	.	87	63
WESTERN																
FT Lewis, WA	.	.	10	3	361	511	57	60	1	.	24	8	.	.	.	.
FT Irwin, CA	.	1	.	1	65	45	9	5	3	.	.	.	.	.	10	18
FT Wainwright, AK	.	.	17	.	97	157	14	11	.	.	.	.	15	22	.	.
OTHER LOCATIONS																
Hawaii	.	1	6	.	562	443	70	44	.	.	.	.	.	.	33	3
Germany	21	19	11	7	441	401	133	127	3	2	1	3	.	.	4	35
Korea	.	.	13	11	406	407	67	47	3	1	.	1	2	20	12	9
Total	**50**	**61**	**82**	**58**	**7,806**	**8,053**	**1,506**	**1,365**	**34**	**37**	**218**	**157**	**24**	**50**	**611**	**576**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers,* January-September 2006 and January-September 2007

Navy

Reporting locations	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA																
Annapolis, MD	21	0	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Bethesda, MD	65	35	4	1	5	.	2	2	2	.	.	.	.	1	.	.
Patuxent River, MD	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	7	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	13	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Beaufort, SC	77	247	.	.	.	.	2	.	.	1	.	.	.	.	.	.
Camp Lejeune, NC	440	293	1	.	.	.	14	5	.	.	.	.	.	.	1	.
Cherry Point, NC	71	106	.	.	1	.	2	2	.	.	.	.	.	.	.	3
Great Lakes, IL	0	170	.	.	.	1	.	3	.	.	.	.	.	.	.	.
Jacksonville, FL	105	155	.	1	.	.	5	5	.	3	.	.	1	.	.	.
Mayport, FL	26	23	.	1	.	.	1	4	.	.	.	.	.	.	.	.
NABLC Norfolk, VA	14	49	.	.	.	.	1	.	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	199	330	.	.	.	.	.	.	.	.	.	.	1	.	.	.
NEHC Norfolk, VA	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	2
North Charleston, SC	0	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	63	80	.	.	.	2	3	4	.	3	.	.	.	.	.	5
Portsmouth, VA	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	0	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	0	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Europe	20	22	4	.	1	.	1	.	1	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	44	12	.	.	.	.	3	1	.	.	.	.	2	.	.	.
Corpus Christi, TX	1	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fallon, NV	3	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	66	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	9	0	3	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	72	313	.	3	1	2	7	3	1	2	.	.	4	28	.	.
Guam	60	31	2	.	.	.	3	1	.	.	.	.	.	.	.	.
Japan	107	60	.	.	.	.	3	.	.	.	.	.	.	.	.	1
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	87	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	44	26	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Total	**1,621**	**1,985**	**14**	**6**	**9**	**5**	**47**	**30**	**4**	**9**	**0**	**0**	**8**	**29**	**1**	**12**

*Events reported by October 7, 2006 and 2007

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers,* January-September 2006 and January-September 2007

Navy

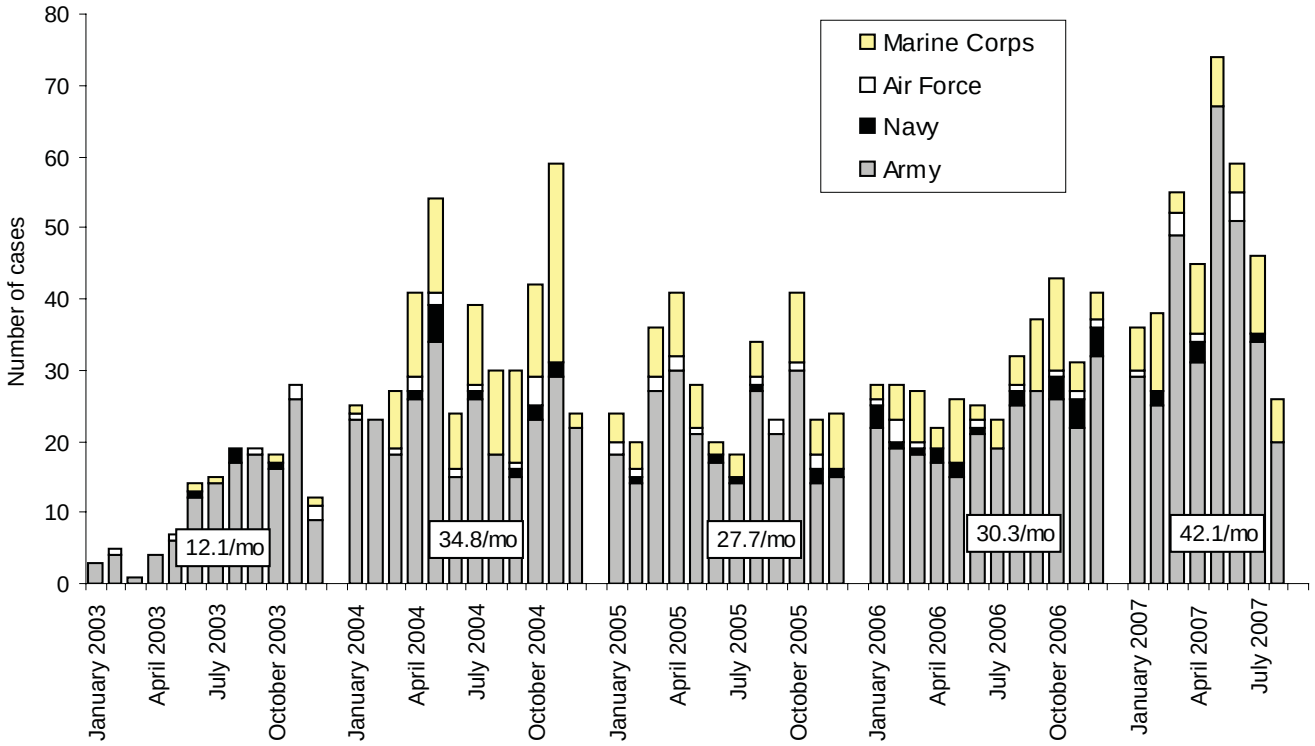
Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
NATIONAL CAPITOL AREA																
Annapolis, MD	.	.	.	.	16	.	3	.	.	.	.	.	.	.	.	.
Bethesda, MD	2	4	.	.	29	20	4	2	.	1	.	.	.	.	.	.
Patuxent River, MD	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	.	.	.	.	7	.	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	.	.	.	.	8	1	5	1	.	1	.	.	.	.	.	.
Beaufort, SC	.	.	.	.	36	166	.	18	.	2	.	.	.	.	39	54
Camp Lejeune, NC	2	12	.	1	333	226	69	30	.	.	.	.	.	.	13	17
Cherry Point, NC	.	.	.	.	58	84	5	7	.	1	.	.	.	.	5	3
Great Lakes, IL	.	.	.	.	.	143	.	16	.	.	.	.	.	.	.	.
Jacksonville, FL	.	.	.	.	52	107	8	17	2	2	.	.	.	.	2	8
Mayport, FL	.	.	.	.	25	15	.	.	.	1	.	.	.	.	.	.
NABLC Norfolk, VA	.	.	.	.	9	45	3	4	.	.	.	.	.	.	1	.
NBMC Norfolk, VA	.	.	.	.	159	272	33	56	1	.	.	.	.	.	.	.
NEHC Norfolk, VA	.	.	.	.	.	2	.	.	.	.	.	.	1	.	1	.
North Charleston, SC	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
Pensacola, FL	.	.	.	.	58	46	1	5	.	.	.	.	.	.	.	12
Portsmouth, VA	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	.	.	.	.	.	5	.	.	.	1	.	.	.	.	.	.
Guantanamo Bay, Cuba	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
Europe	.	.	1	.	11	21	1	1	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	.	.	.	.	38	9	1	1	.	1	.	.	.	.	.	.
Corpus Christi, TX	.	.	.	.	1	3	.	1	.	.	.	.	.	.	.	.
Fallon, NV	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	.	.	.	.	24	.	4	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	.	.	.	.	4	.	1	.	.	.	.	.	.	.	.	.
San Diego, CA	.	1	1	.	41	197	8	35	1	5	.	.	.	.	.	.
Guam	.	.	1	.	43	25	9	4	.	.	.	.	.	.	.	.
Japan	.	.	.	.	95	41	8	10	.	.	.	.	.	.	1	5
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	2	.	.	.	66	6	17	2	2	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	6	16	35	8	.	.	3	.	.	.	.	1
Total	**6**	**17**	**3**	**1**	**1,127**	**1,458**	**215**	**218**	**6**	**15**	**3**	**0**	**1**	**0**	**62**	**100**

‡Primary and secondary.

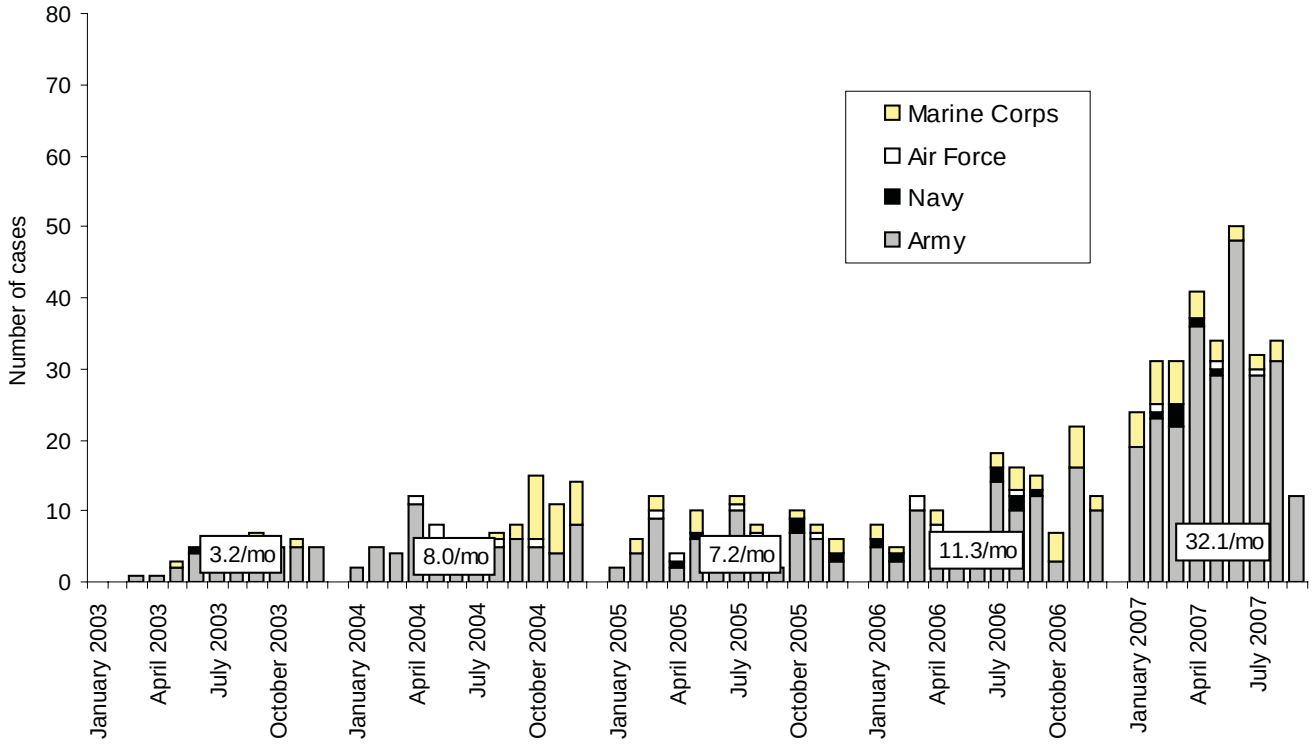
§Urethritis, non-gonococcal (NGU).

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - September 2007

Traumatic brain injury, hospitalizations (ICD-9: 800-804, 850-854, 959.01)*



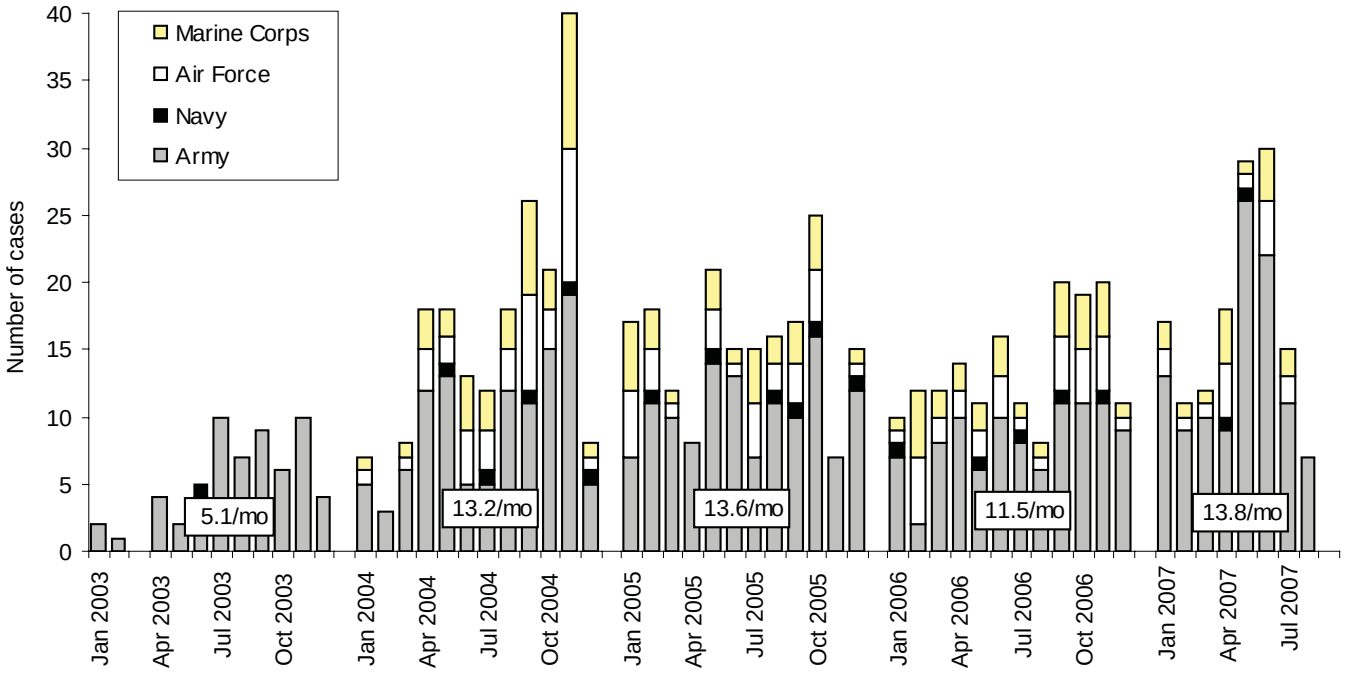
Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 800-804, 850-854, 959.01)†



Reference: Army Medical Surveillance Activity. Traumatic brain injury among members of active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):2-6.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.
†Two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

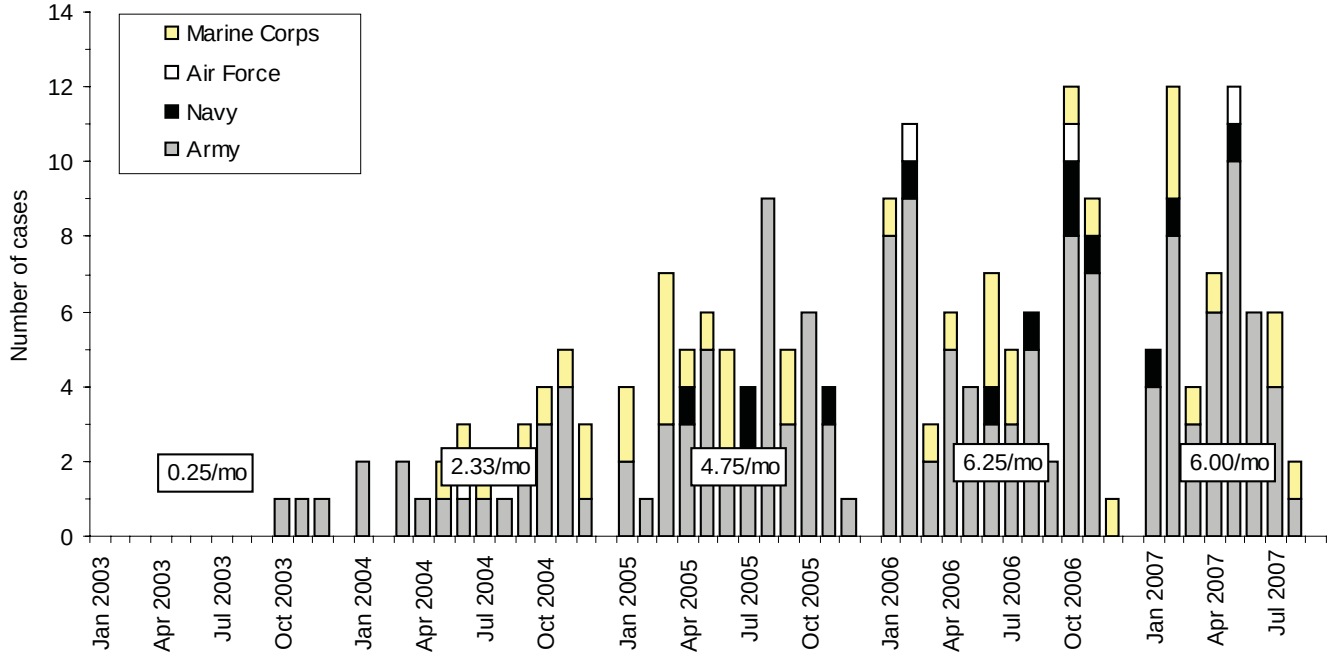
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - September 2007

Amputations (ICD-9: 887, 896, 897, V49.6 to V49.7, PR 84.0 to PR 84.1)*



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.
*Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 365 days of returning from OEF/OIF.

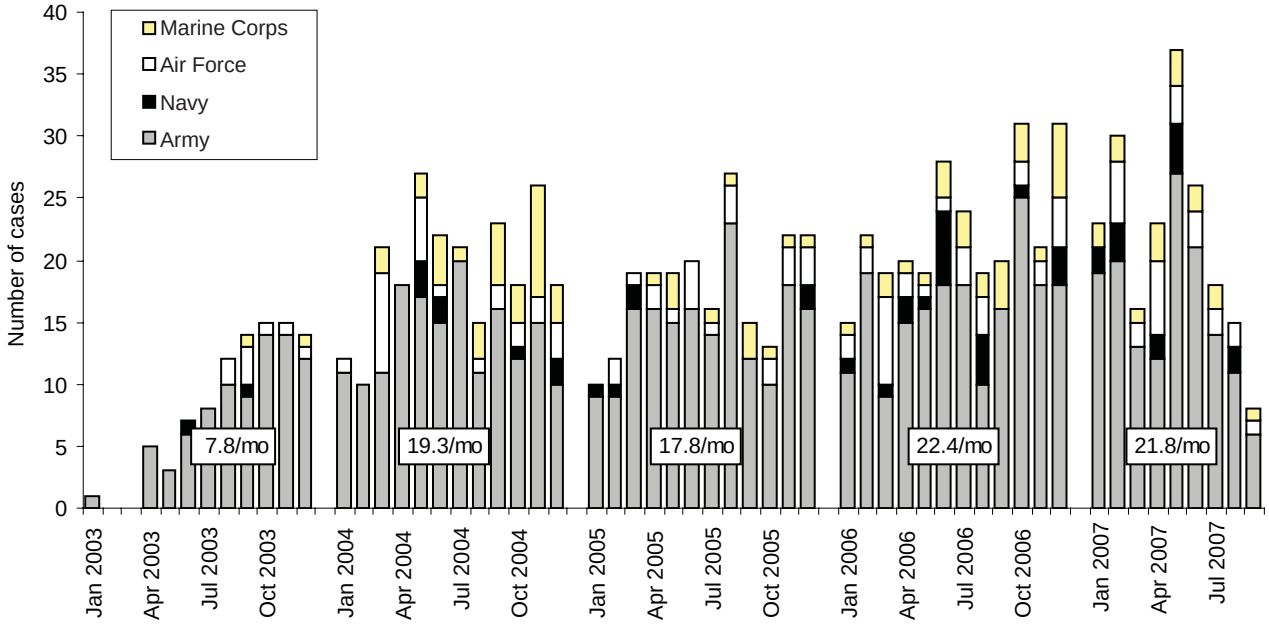
Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)†



Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.
†One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

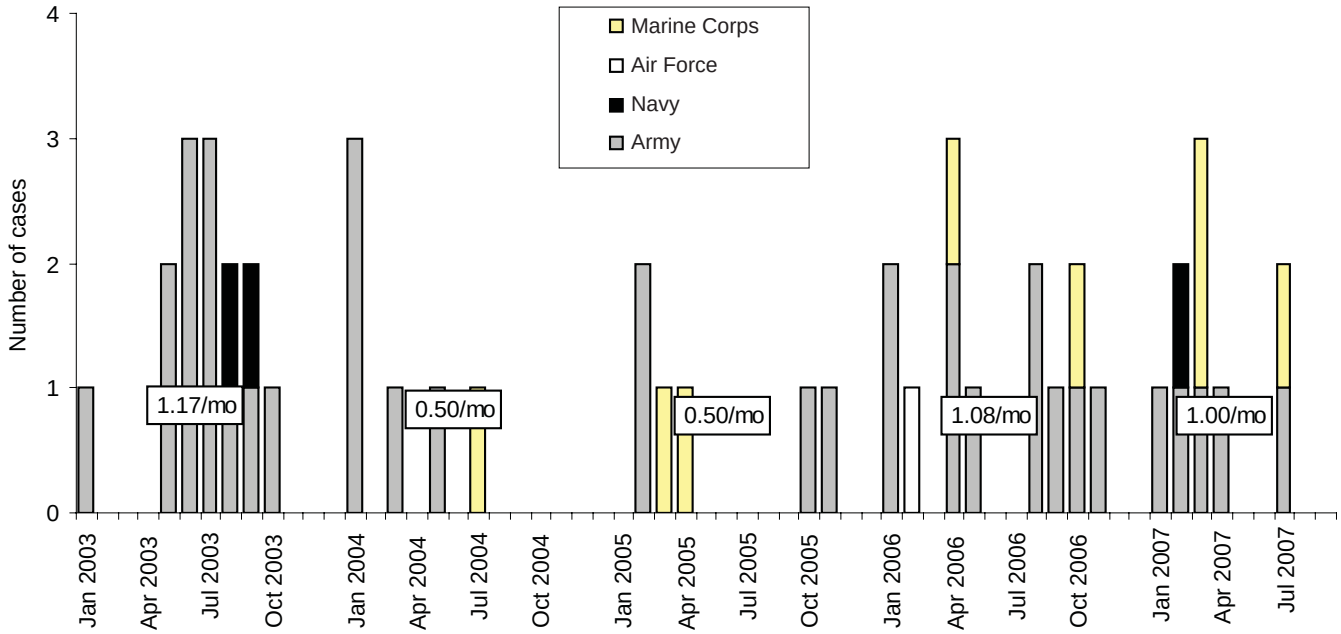
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - September 2007

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 to 453.42 and 453.8)*



Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*.2006;117(4):379-83.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 90 days of returning from OEF/OIF.

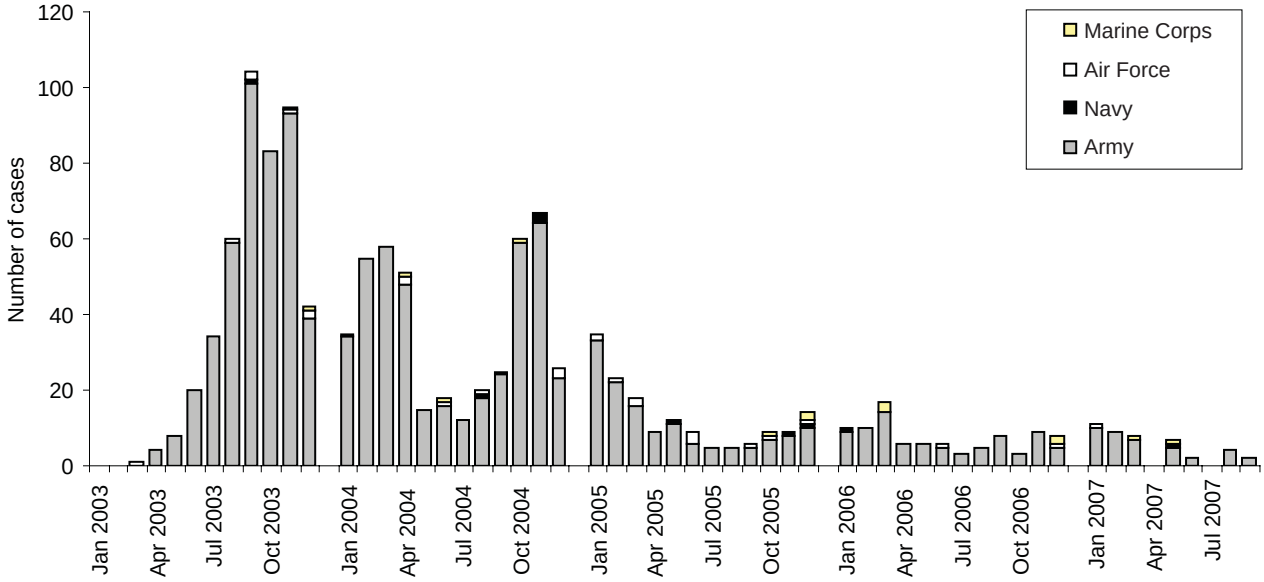
Severe acute pneumonia (ICD-9: 518.81, 518.82, 518.3, 480-487, 786.09)†



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.
†Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - September 2007

Leishmaniasis (ICD-9: 085.0 to 085.9)*



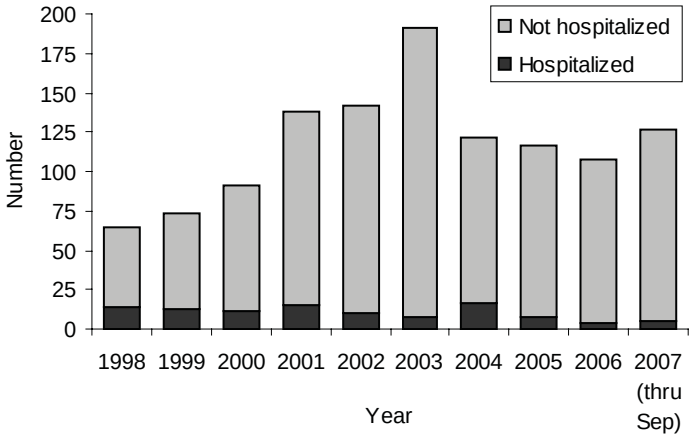
Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: leishmaniasis. Leishmaniasis among U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):2-4.

*Indicator diagnosis (one per individual) during a hospitalization, ambulatory visit, and/or from a notifiable medical event during/after service in OEF/OIF.

SURVEILLANCE SNAPSHOT:

Carbon monoxide poisoning, by year, U.S. Armed Forces, January 1998-September 2007

Carbon monoxide poisoning,* by year, U.S. Armed Forces, January 1998 - September 2006



Prevent carbon monoxide poisoning

- Install a CO detector/alarm that bears the certification code UL 2034 or IAS-696
- Ensure furnaces and heaters are serviced regularly by a qualified technician
- Never operate unvented fuel-burning appliances in rooms or tents where people are sleeping
- Never sleep in a vehicle with the engine running
- If you experience symptoms of CO poisoning such as headache, fatigue or nausea, get fresh air immediately and seek medical attention

Episodes of carbon monoxide poisoning,* by location, U.S. Armed Forces, 1998-2007

Location	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	%
Ft. Hood, TX	3	11	2	6	5	1	4	1	3	5	41	3.5
Ft. Carson, CO	3	4	7	1	1	2	2	.	.	6	26	2.2
Ft. Bragg, NC	1	1	2	3	3	3	7	1	2	1	24	2.0
Ft. Sill, OK	1	2	1	8	.	4	.	5	.	1	22	1.9
McConnell AFB, KS	.	.	.	.	.	20	.	1	1	.	22	1.9
Peterson AFB, CO	.	.	10	1	.	3	.	2	1	2	19	1.6
Ft. Lewis, WA	1	1	1	2	1	2	1	1	3	4	17	1.5
Eglin AFB, FL	.	2	2	1	.	7	3	1	.	1	17	1.5
Other	56	52	66	116	132	149	105	104	98	106	984	84.0
Total	65	73	91	138	142	191	122	116	108	126	1,172	100.0

*Hospitalizations, ambulatory visits and reportable events that included a diagnosis of ICD-9 code 986 and/or applicable E codes. Only one episode per individual was included in any 30-day period.

In the next *MSMR*:

Medical Encounters Related to Staphylococcal Infections (and Reported Penicillin-Resistance), Active Component Members, U.S. Armed Forces, January 2002-June 2007

Mental Health-related Experiences Within Six Months After Returning from Deployment to Operation Iraqi Freedom (OIF) in 2005, by Results of PTSD Screening on Post-deployment Health Assessments (PDHA), U.S. Armed Forces

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